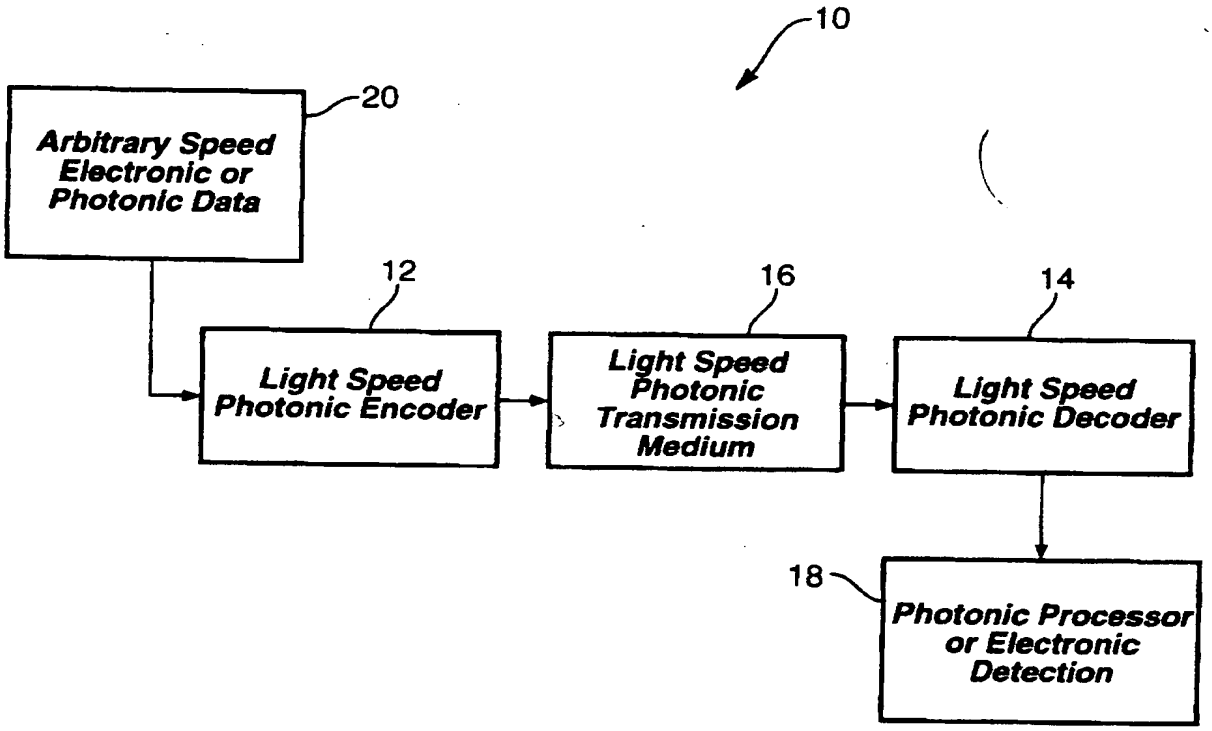


FIG. 1

2807.2.4.10

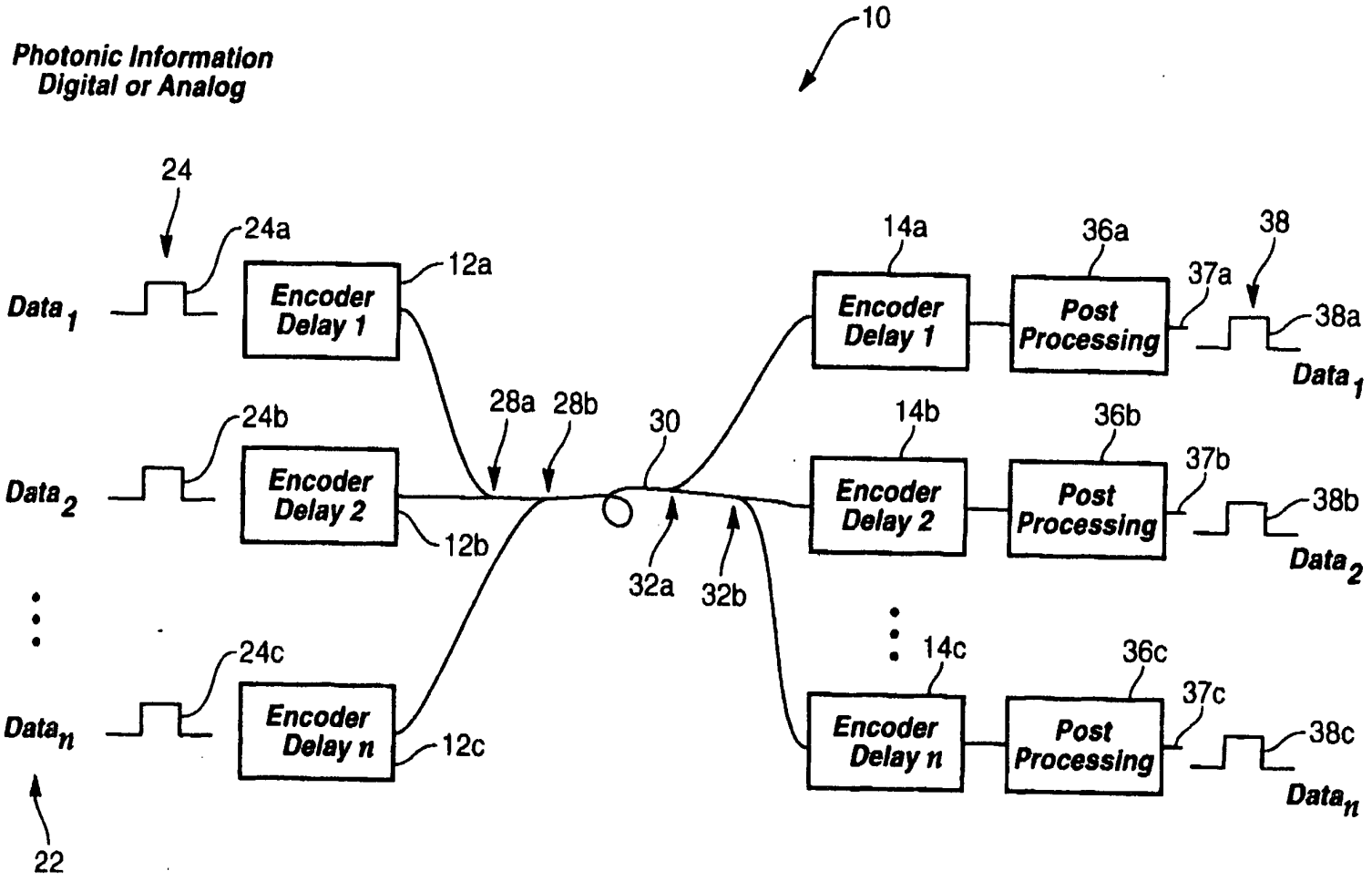
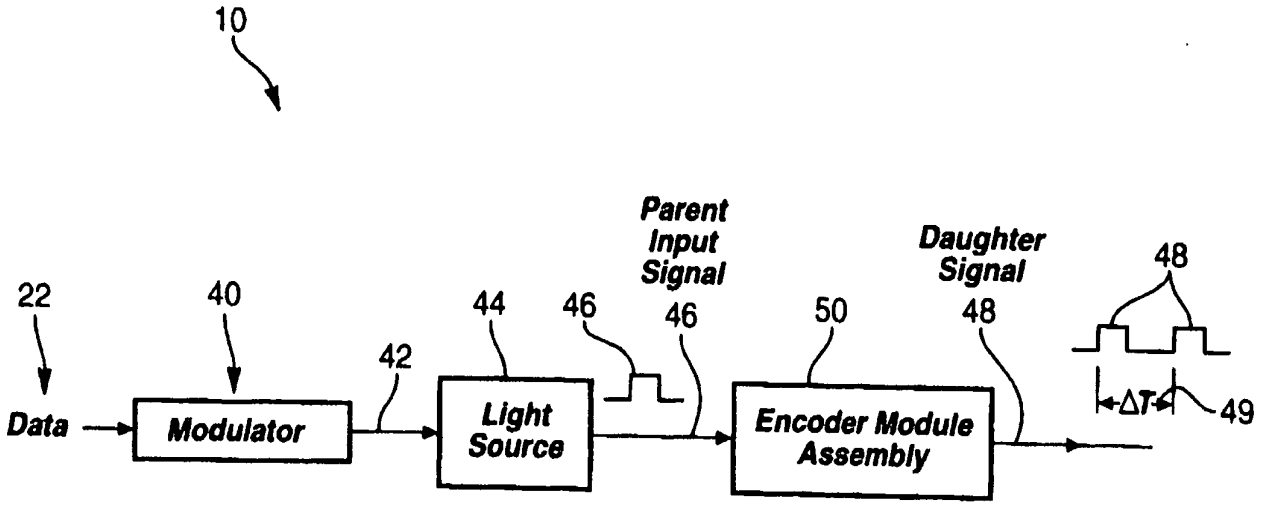


Fig. 2

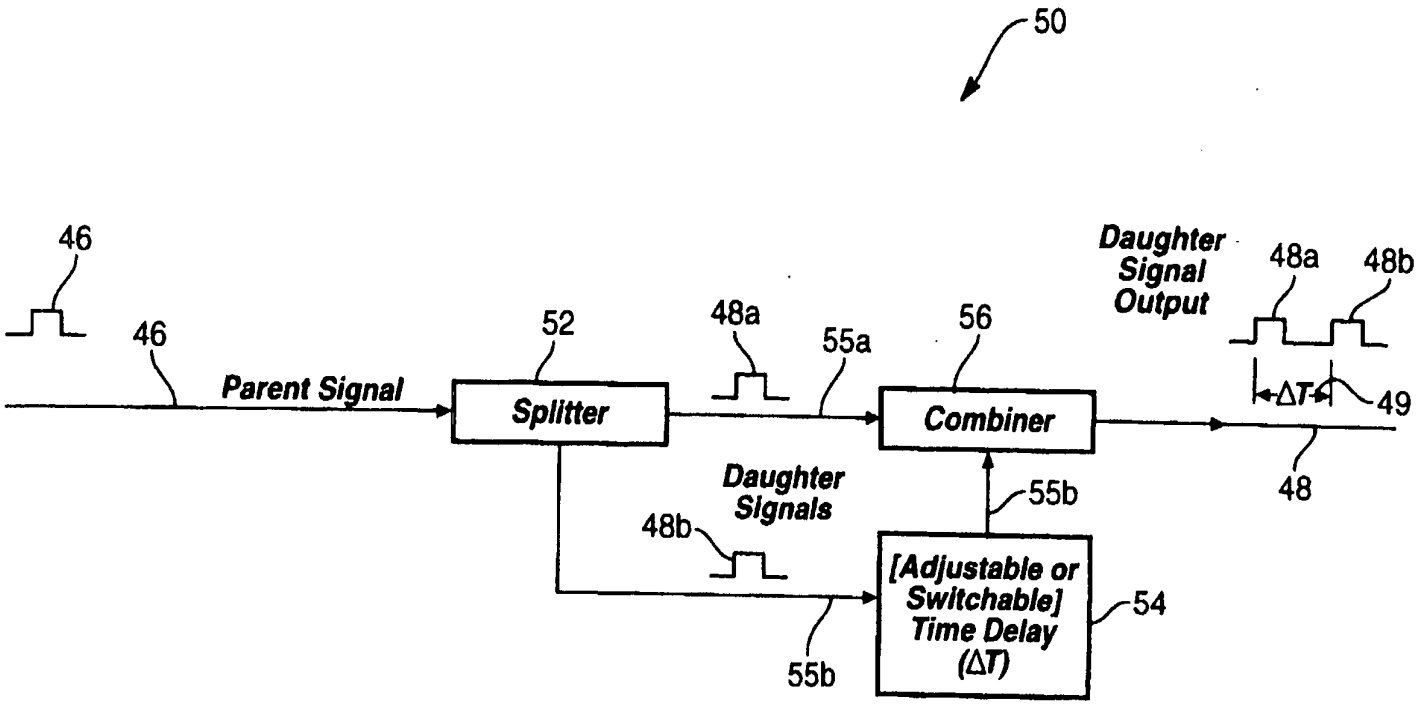
2807.2.4.10



Differential Delay Multiplexer Sender/Encoder

Fig. 3

2807.2.4.10



Differential Delay Multiplexer (DDM) Sender/Encoder

Fig. 4

2807.2.4.

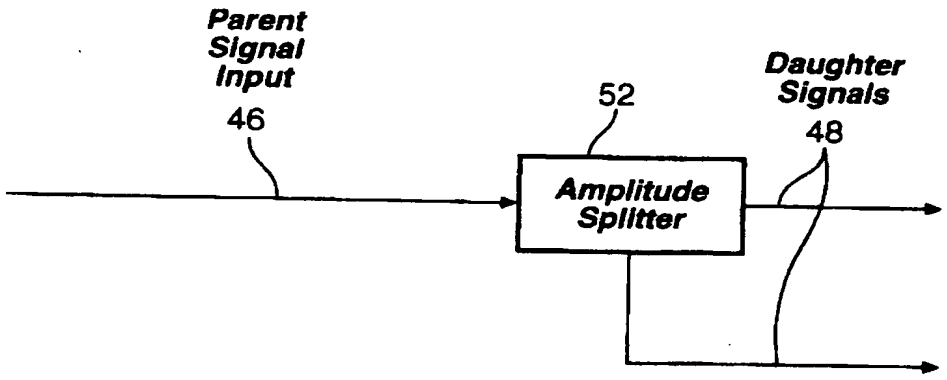
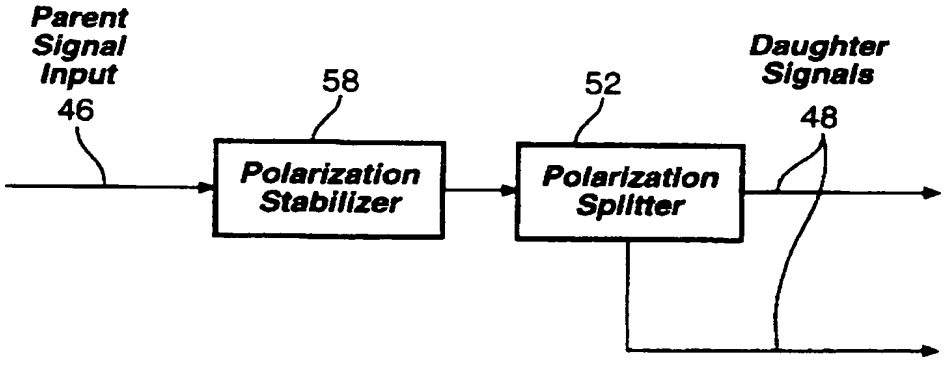


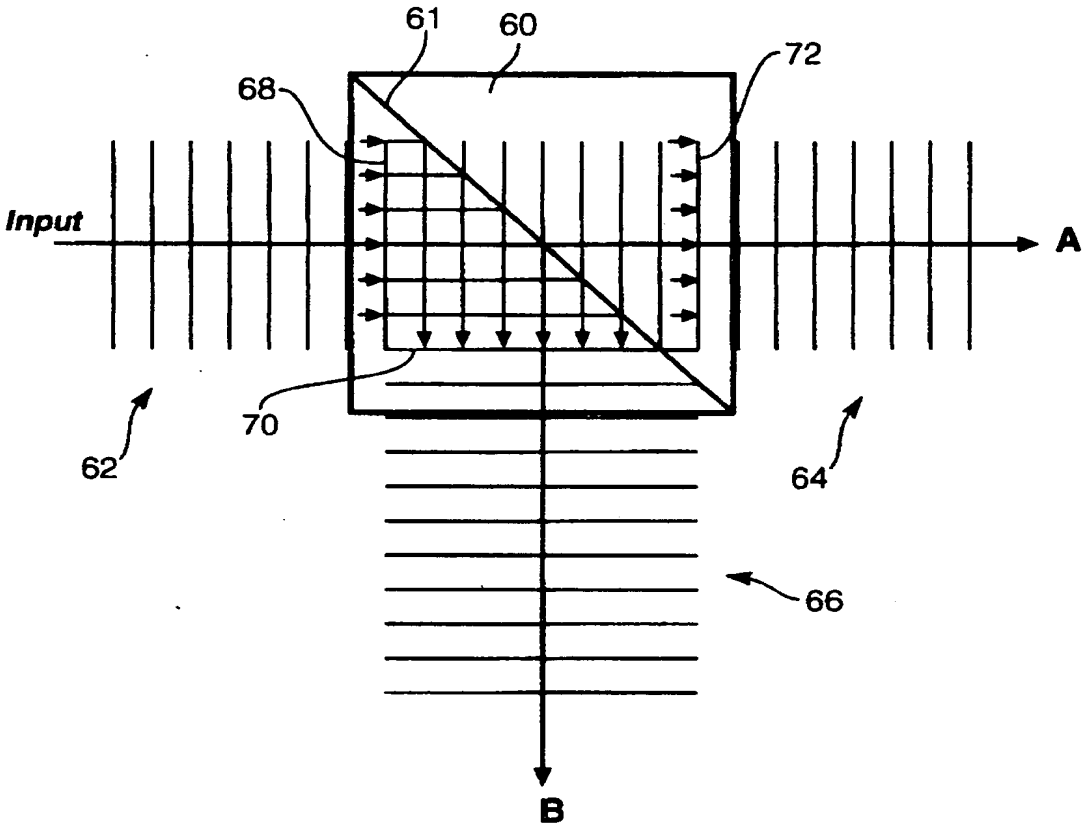
FIG. 5



Splitting Criteria

FIG. 6

2807.2.4.



Amplitude or Polarization Splitter

FIG. 7

2807.2.4.

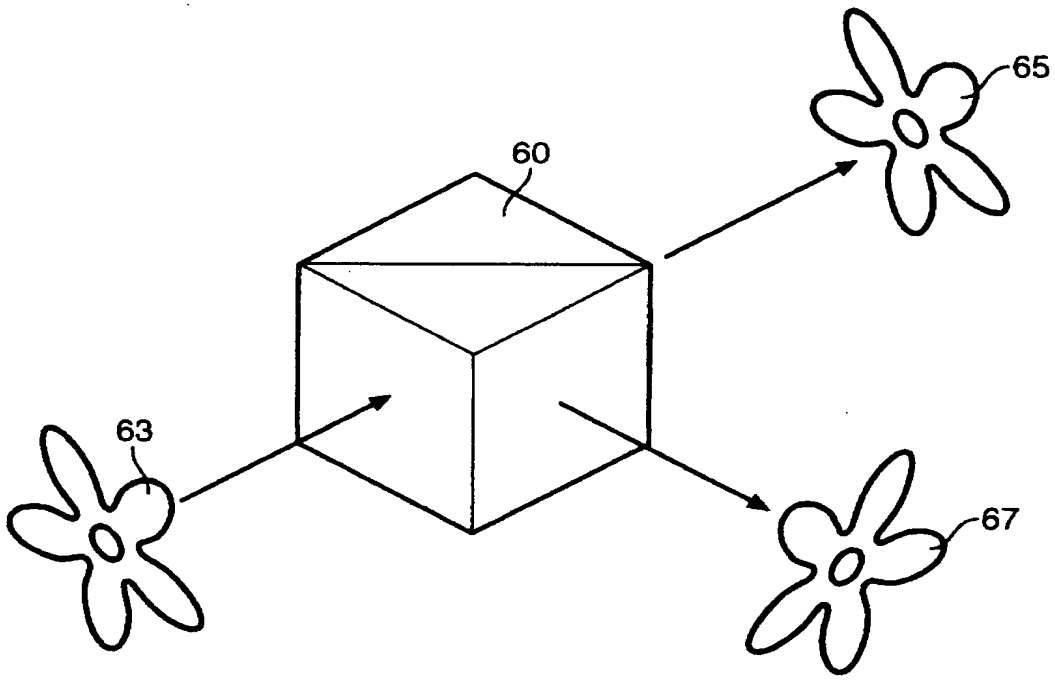
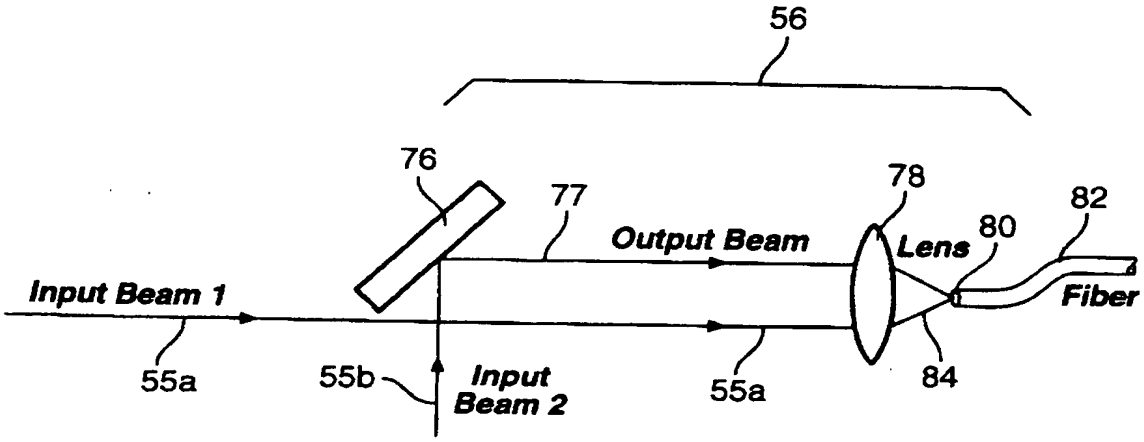


Image Signals Which Maintain Spatial Information

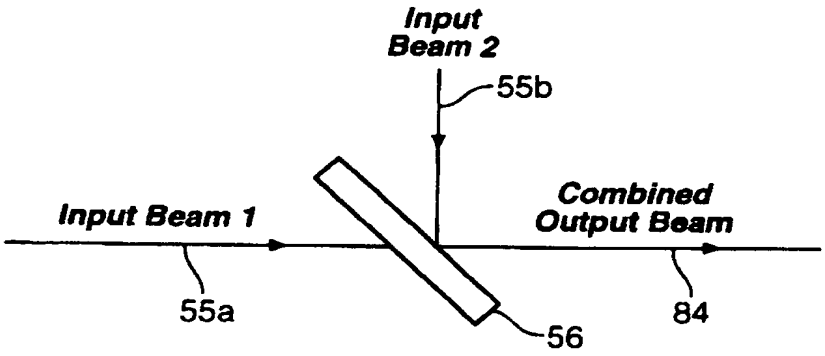
FIG. 7A

2807.2.4.



Beam Combiner

FIG. 8



Amplitude or Polarization Combiner

FIG. 9

2807.2.4.

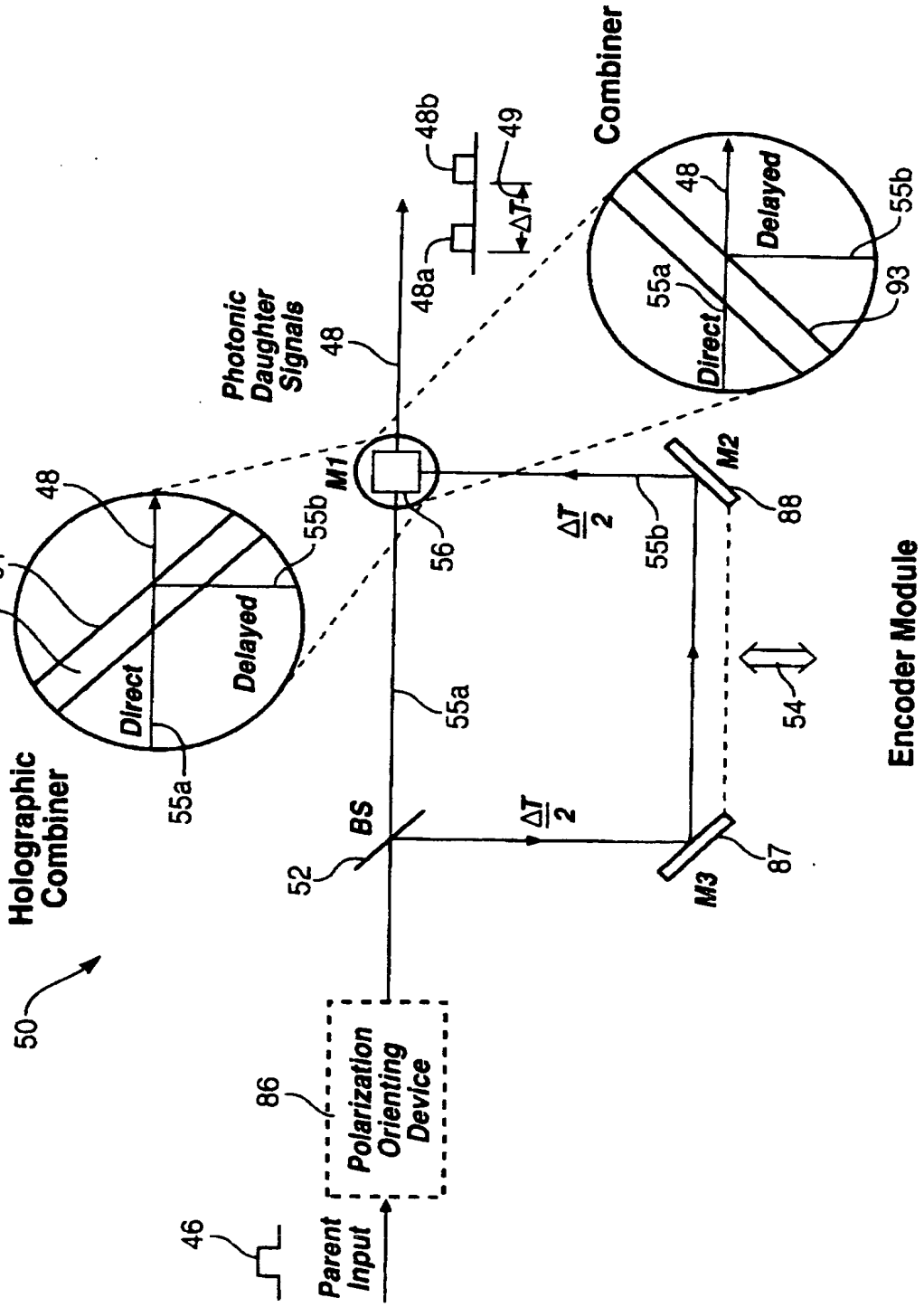
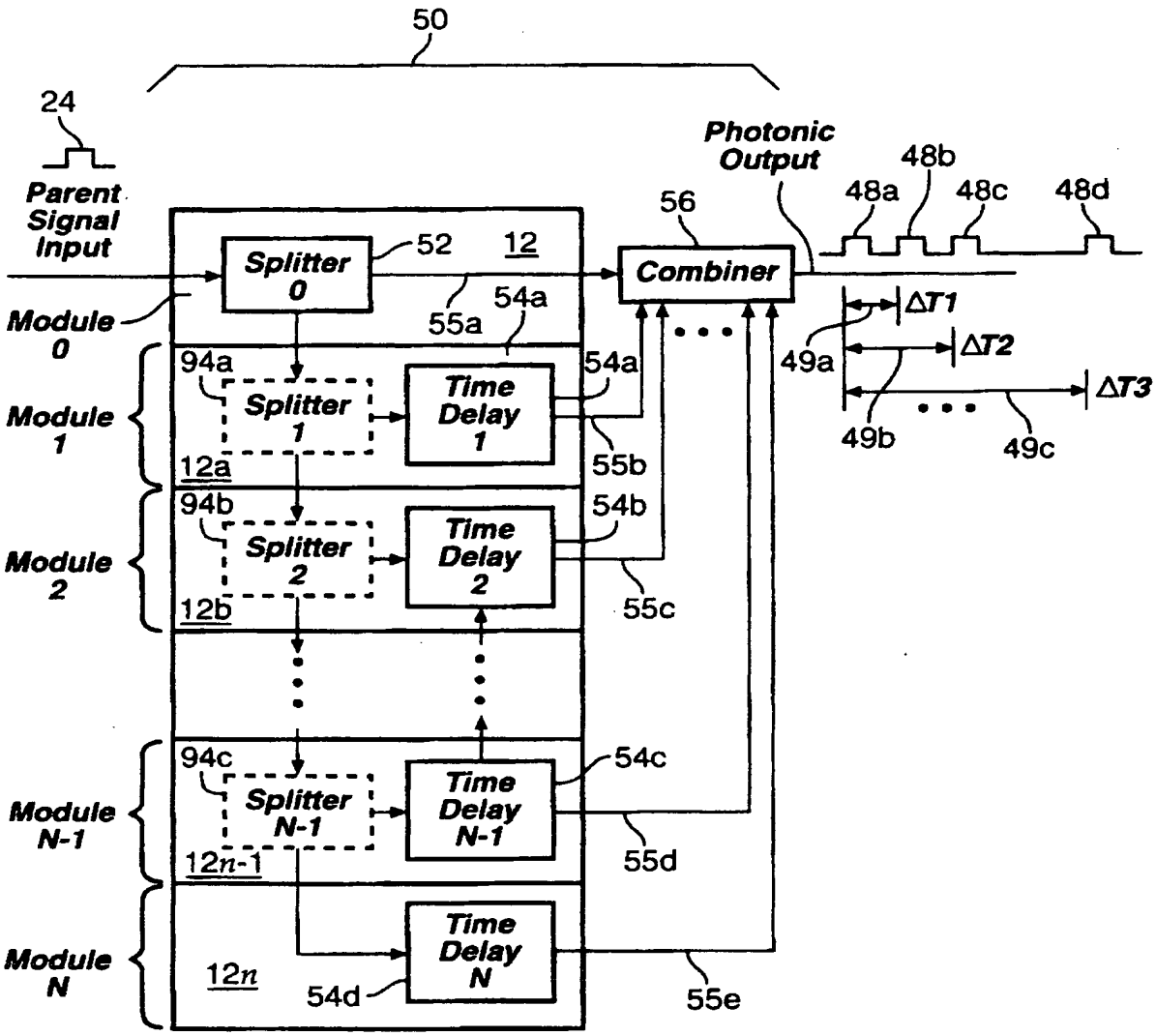


Fig. 10

2807.2.4.



Composite Encoder Module Assembly

FIG. 11

2807.2.4.

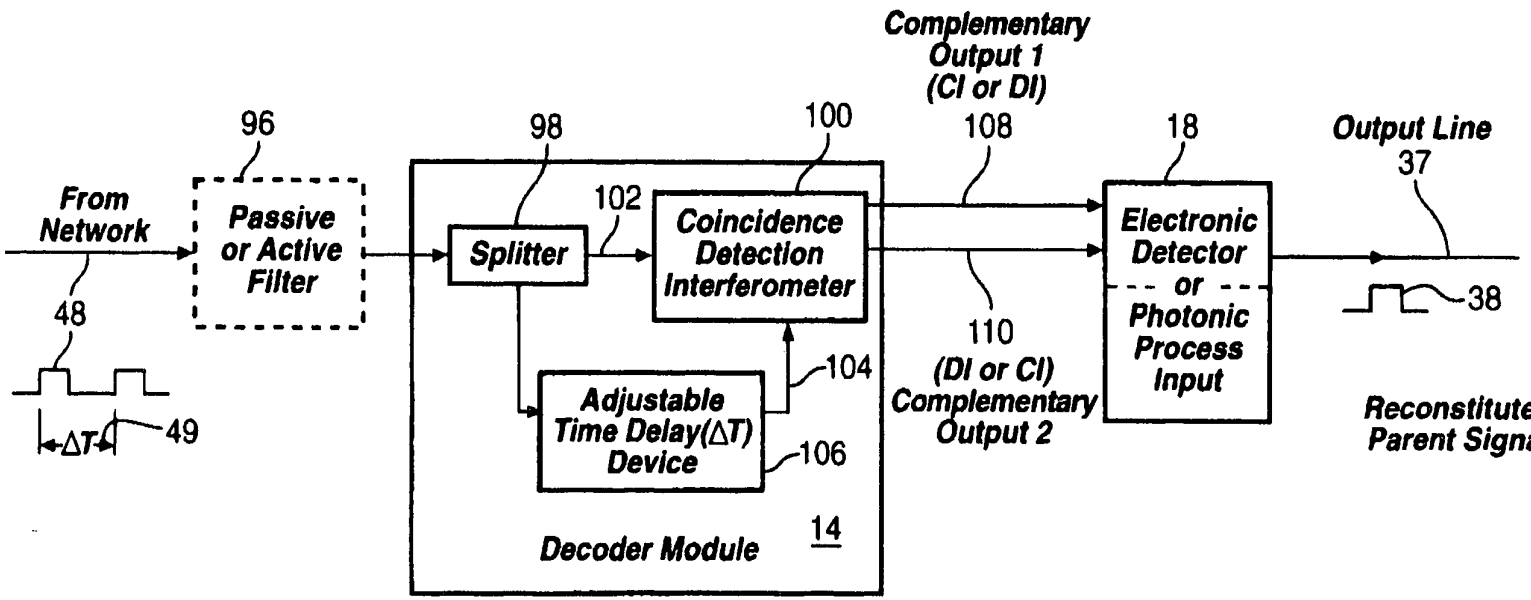

From Network
48
ΔT
49
96
Passive or Active Filter
98
Splitter
102
100
Coincidence Detection Interferometer
104
Adjustable Time Delay(ΔT) Device
106
Decoder Module
14
Complementary Output 1 (CI or DI)
108
110
(DI or CI) Complementary Output 2
18
Electronic Detector
or
Photonic Process Input
Output Line
37
38
Reconstituted Parent Signal

Fig. 12

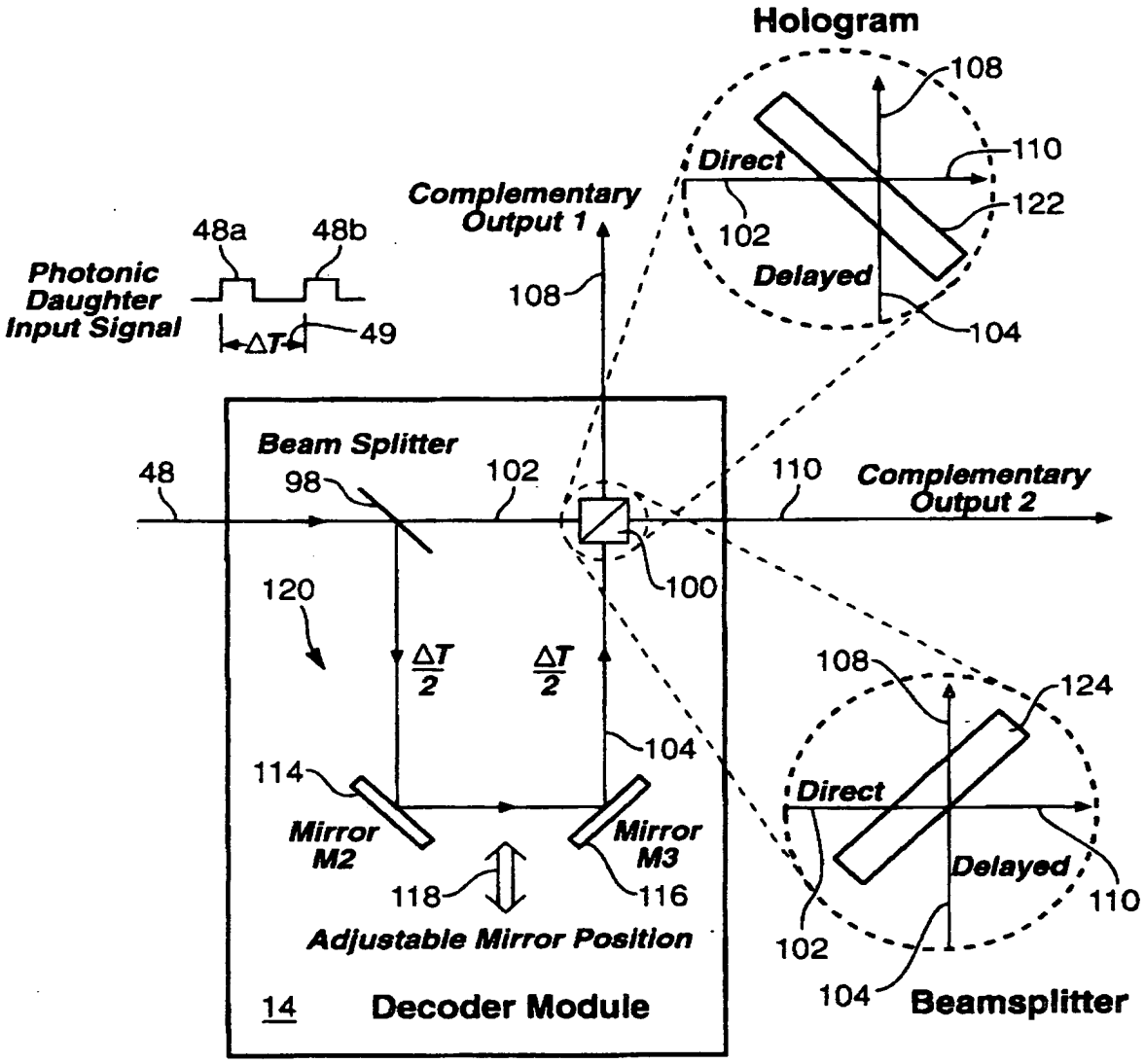

Hologram
108
110
Direct
122
102
Delayed
104
Complementary Output 1
48a
48b
Photonic Daughter Input Signal
ΔT
49
108
Beam Splitter
48
98
102
110
Complementary Output 2
100
120
ΔT/2
ΔT/2
104
114
Mirror M2
Mirror M3
118
116
Adjustable Mirror Position
14
Decoder Module
108
124
Direct
Delayed
110
102
104
Beamsplitter

FIG. 13

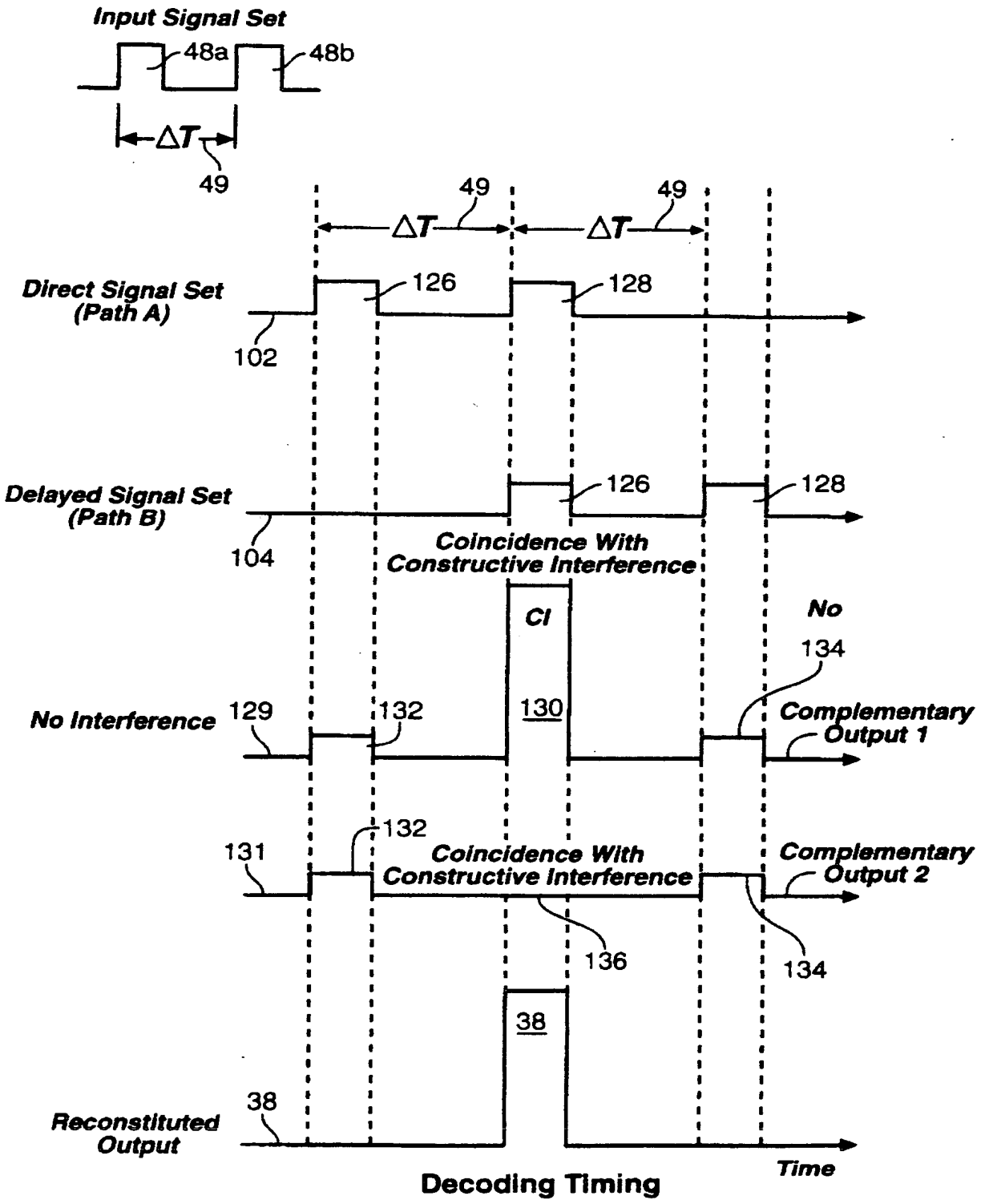

Input Signal Set
48a
48b
ΔT
49
49
49
ΔT
ΔT
Direct Signal Set
(Path A)
126
128
102
Delayed Signal Set
(Path B)
126
128
104
Coincidence With
Constructive Interference
CI
No
134
No Interference
129
132
130
Complementary
Output 1
131
132
Coincidence With
Constructive Interference
Complementary
Output 2
136
134
38
38
Reconstituted
Output
Time
Decoding Timing

FIG. 14

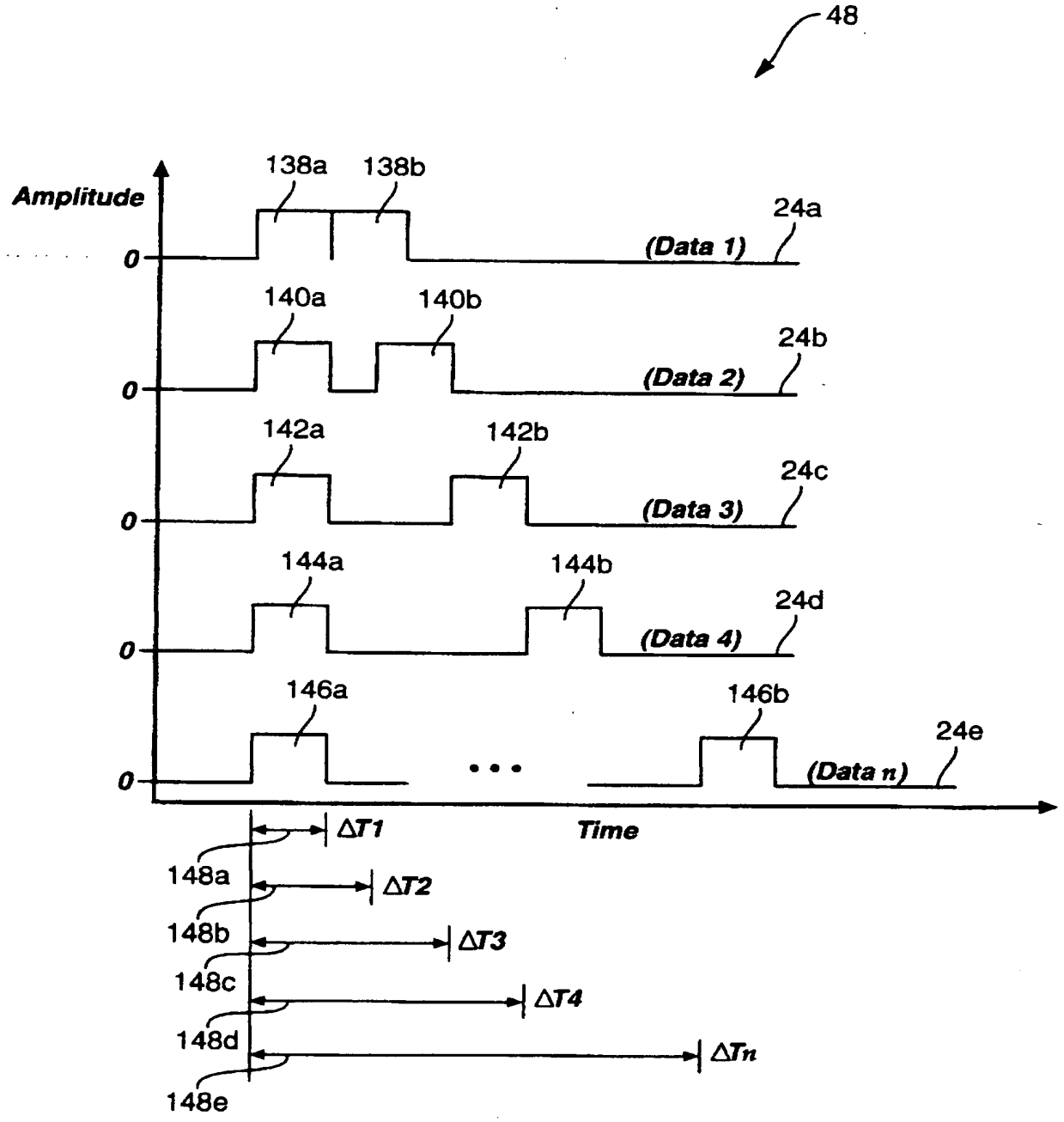

48
Amplitude
0
138a
138b
24a
(Data 1)
140a
140b
24b
(Data 2)
142a
142b
24c
(Data 3)
144a
144b
24d
(Data 4)
146a
146b
24e
(Data n)
Time
ΔT1
148a
ΔT2
148b
ΔT3
148c
ΔT4
148d
ΔTn
148e

Fig. 15

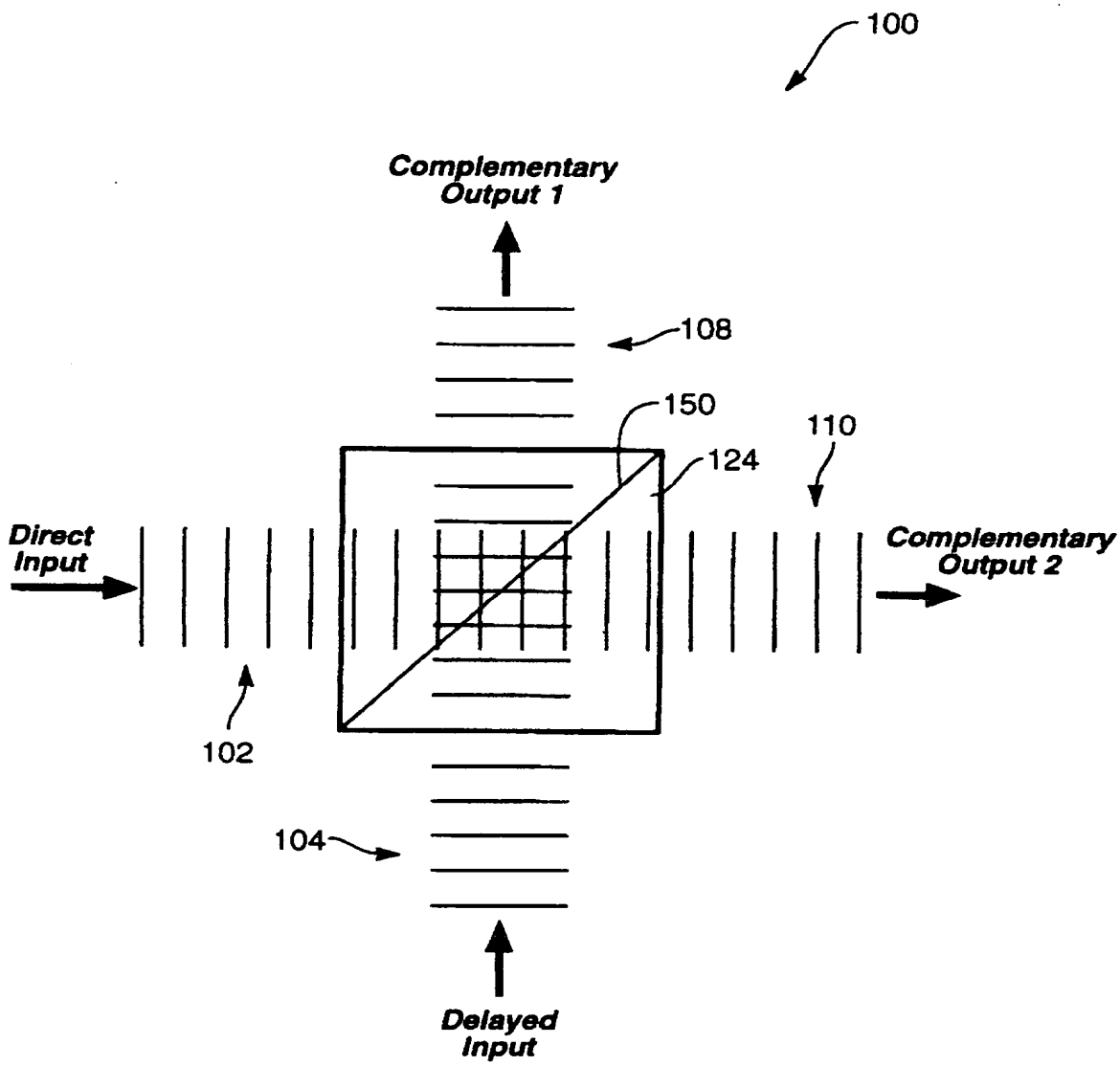

100
Complementary Output 1
108
150
110
124
Direct Input
Complementary Output 2
102
104
Delayed Input

Fig. 16

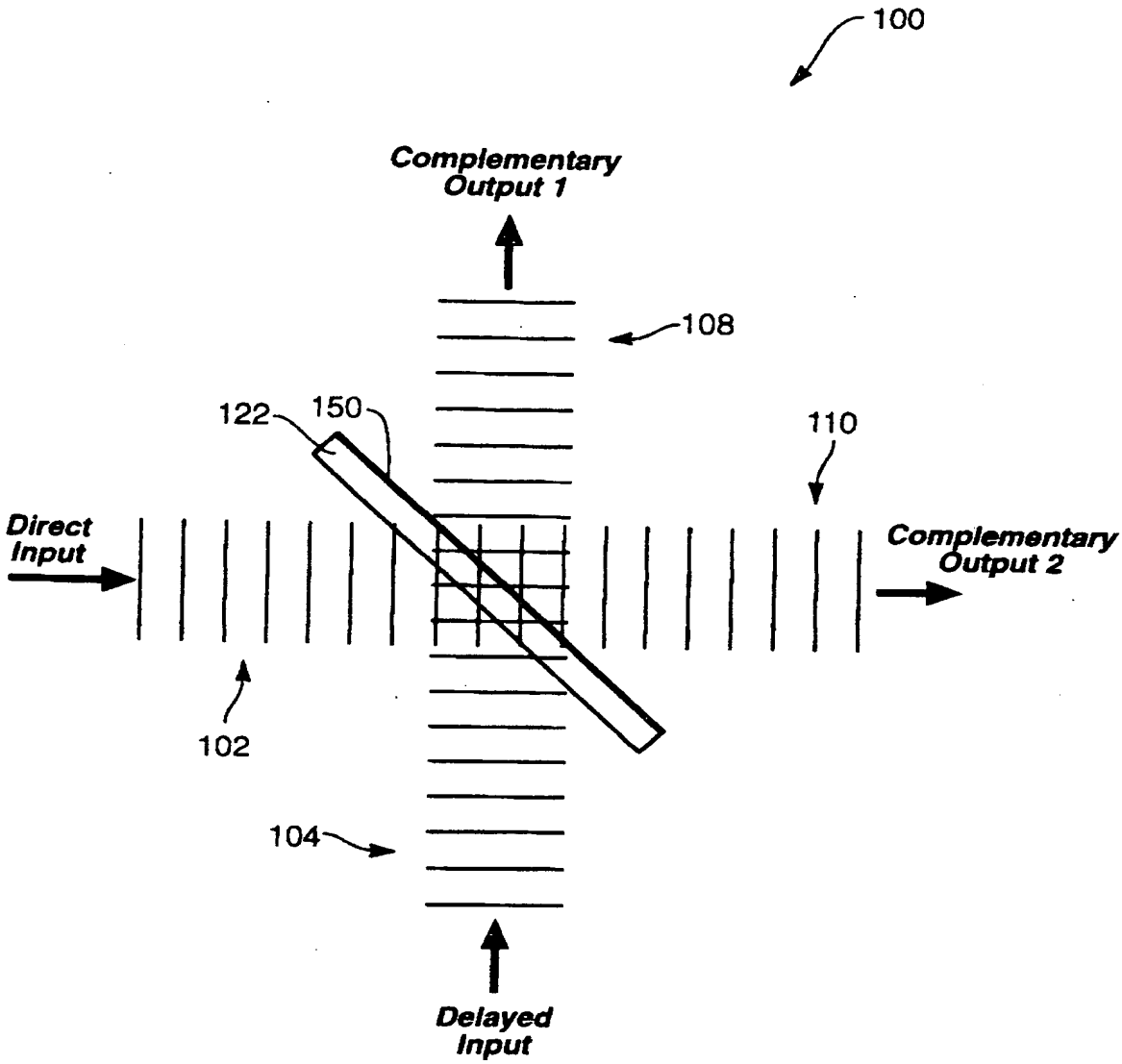

100
Complementary Output 1
108
122
150
110
Direct Input
Complementary Output 2
102
104
Delayed Input

Fig. 17

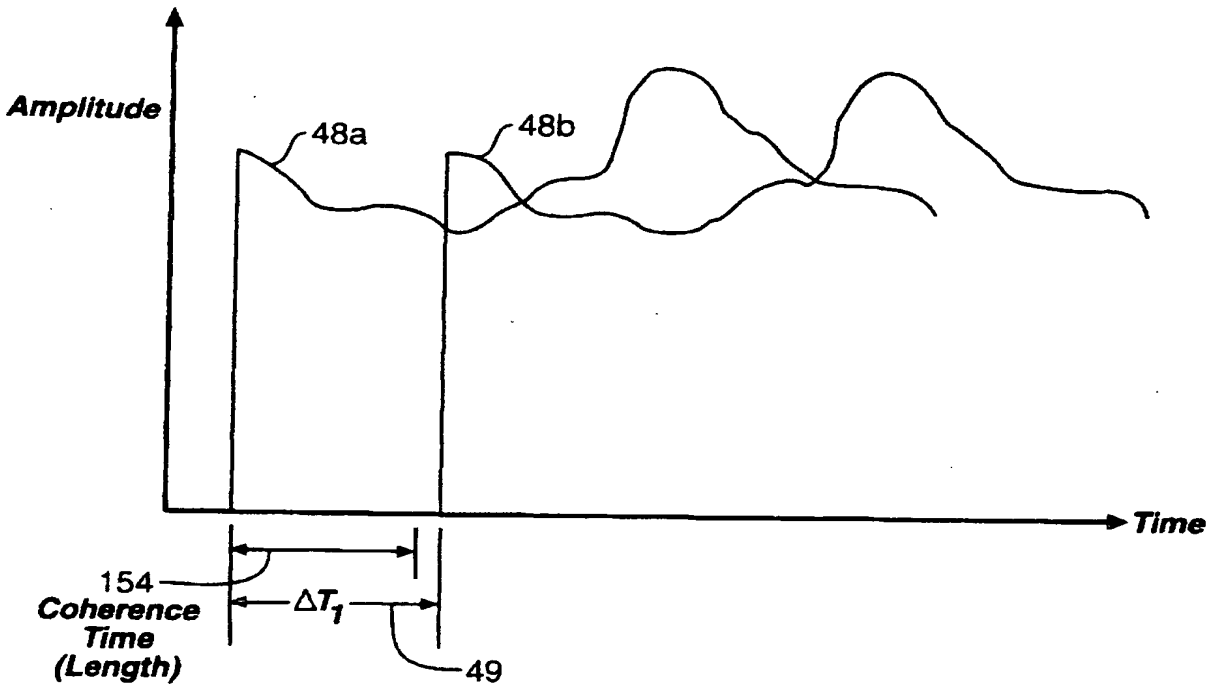

Amplitude
48a
48b
Time
154
Coherence
Time
(Length)
ΔT_1
49

Fig. 18

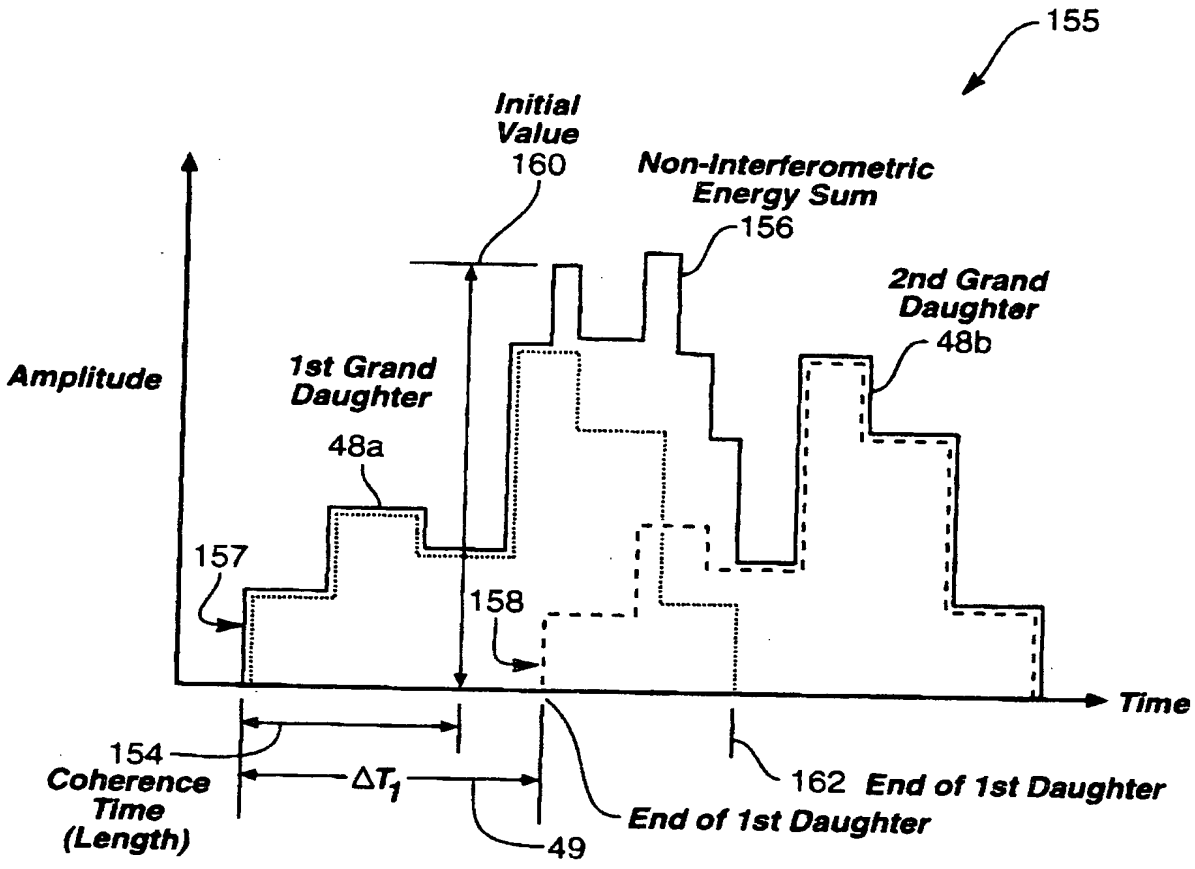

155
Initial Value
160
Non-Interferometric Energy Sum
156
2nd Grand Daughter
48b
Amplitude
1st Grand Daughter
48a
157
158
Time
154
Coherence Time (Length)
ΔT_1
49
162
End of 1st Daughter
End of 1st Daughter

Fig. 19

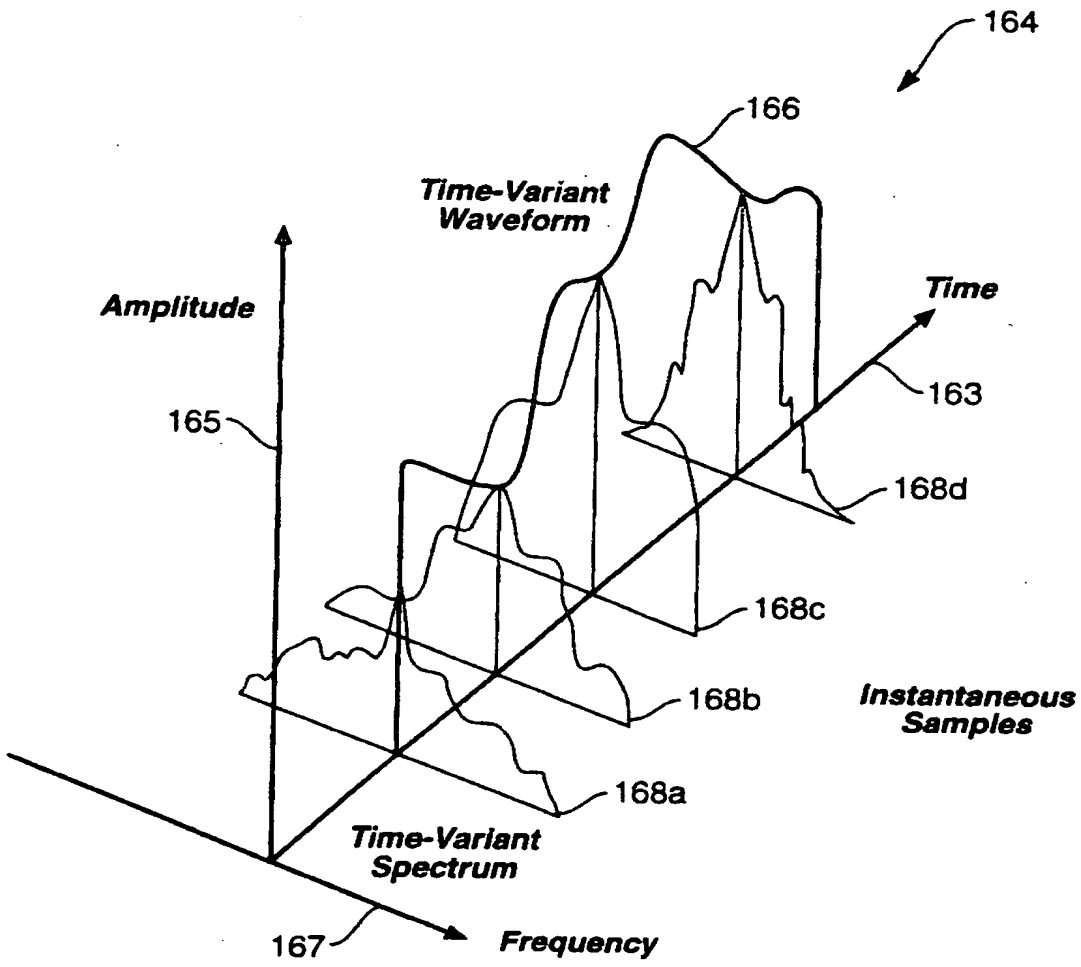

164
166
Time-Variant
Waveform
Amplitude
Time
165
163
168d
168c
168b
Instantaneous
Samples
168a
Time-Variant
Spectrum
167
Frequency

Fig. 20

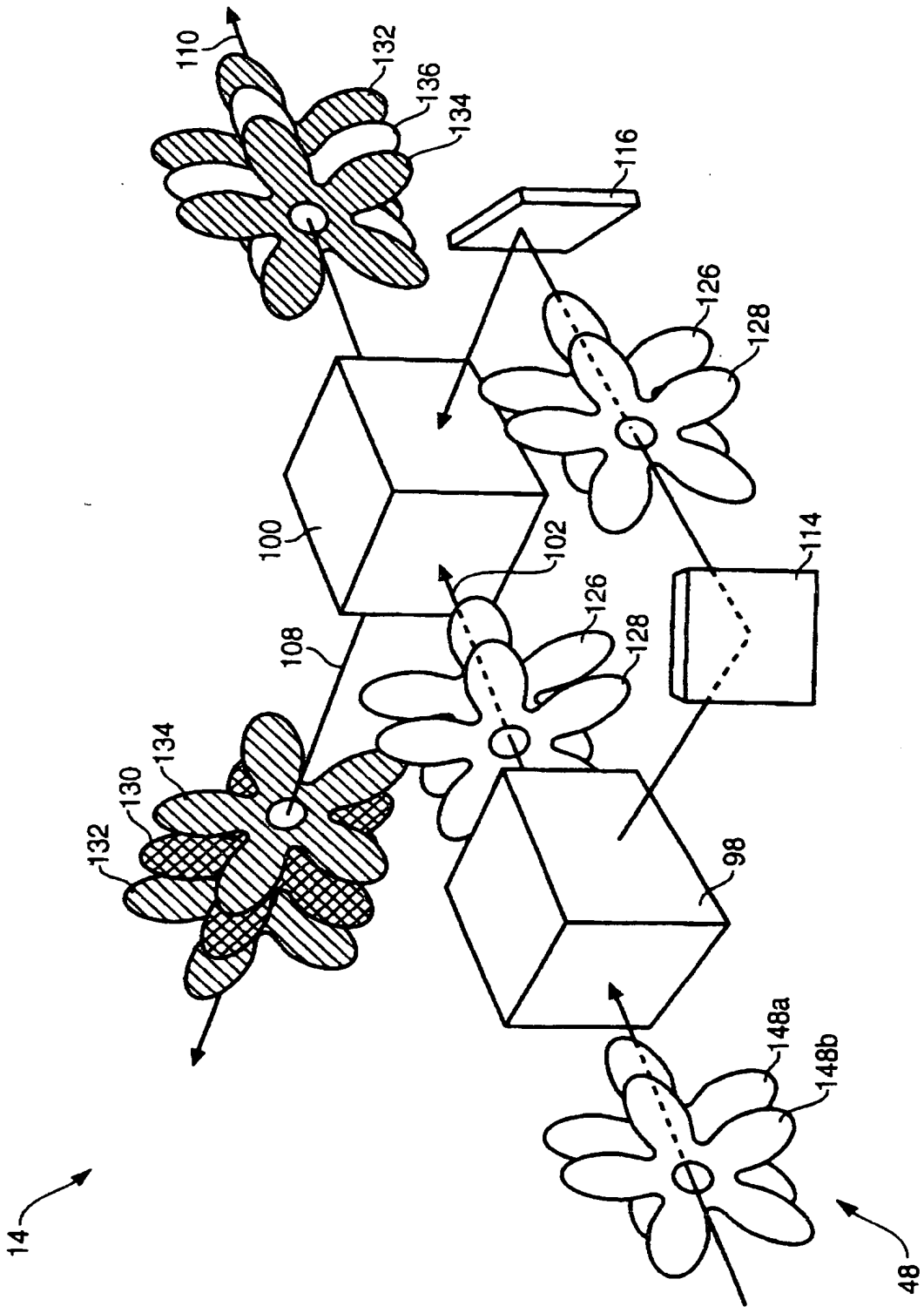
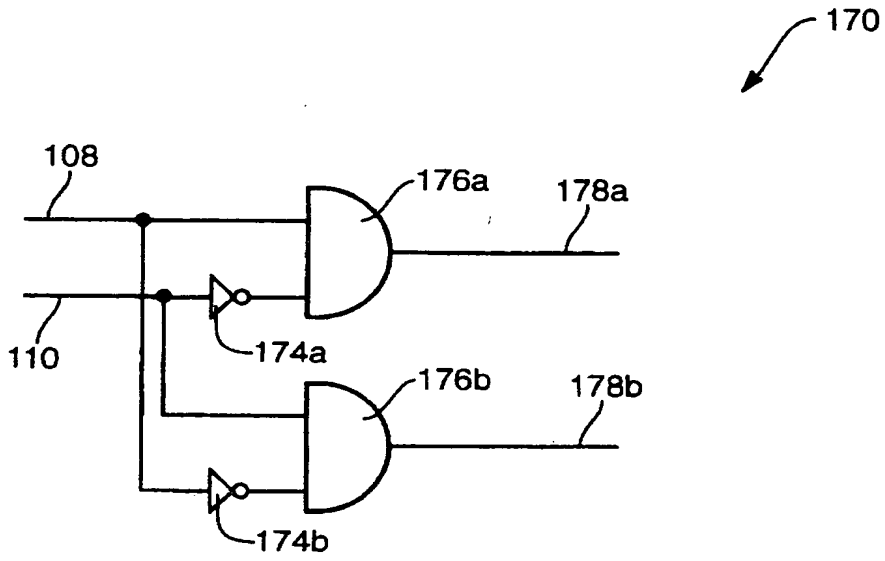
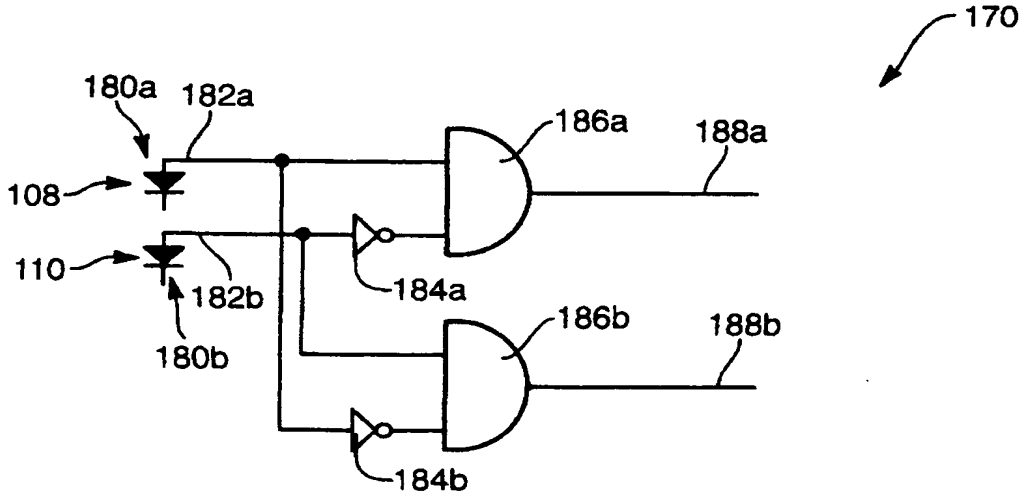

110
132
136
134
116
126
128
100
102
114
108
126
128
134
130
132
98
148a
148b
14
48

Fig. 21



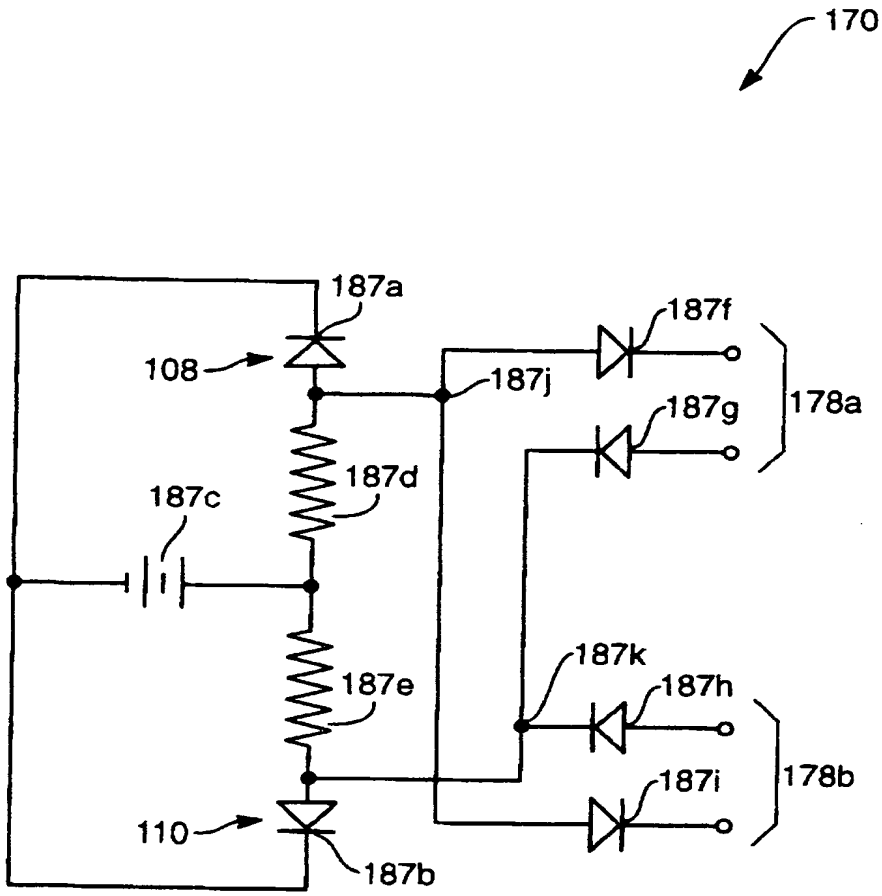
Photonic Processor

Fig. 22



Electronic Processor

Fig. 23A



Electronic Processor

Fig. 23B

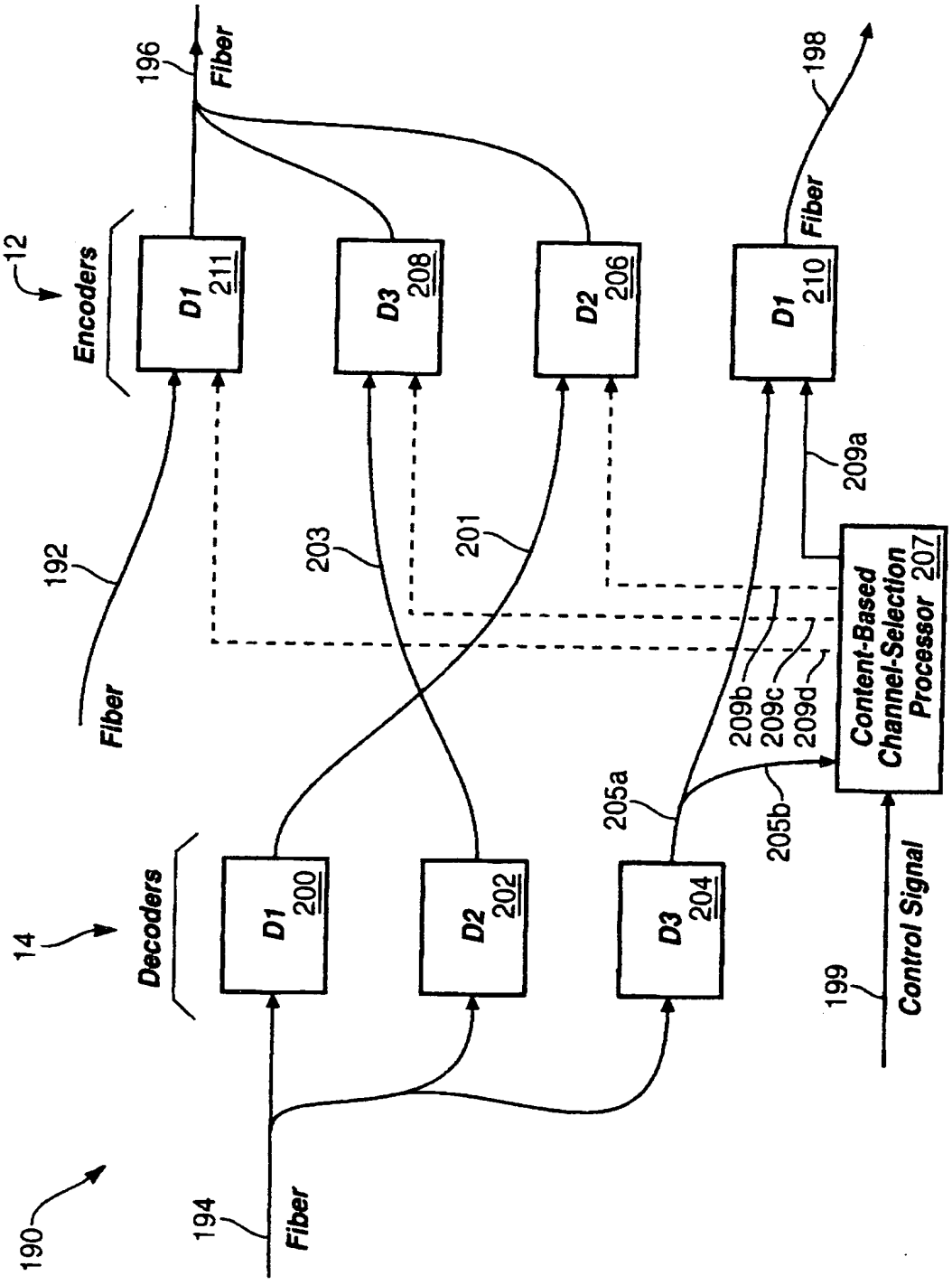
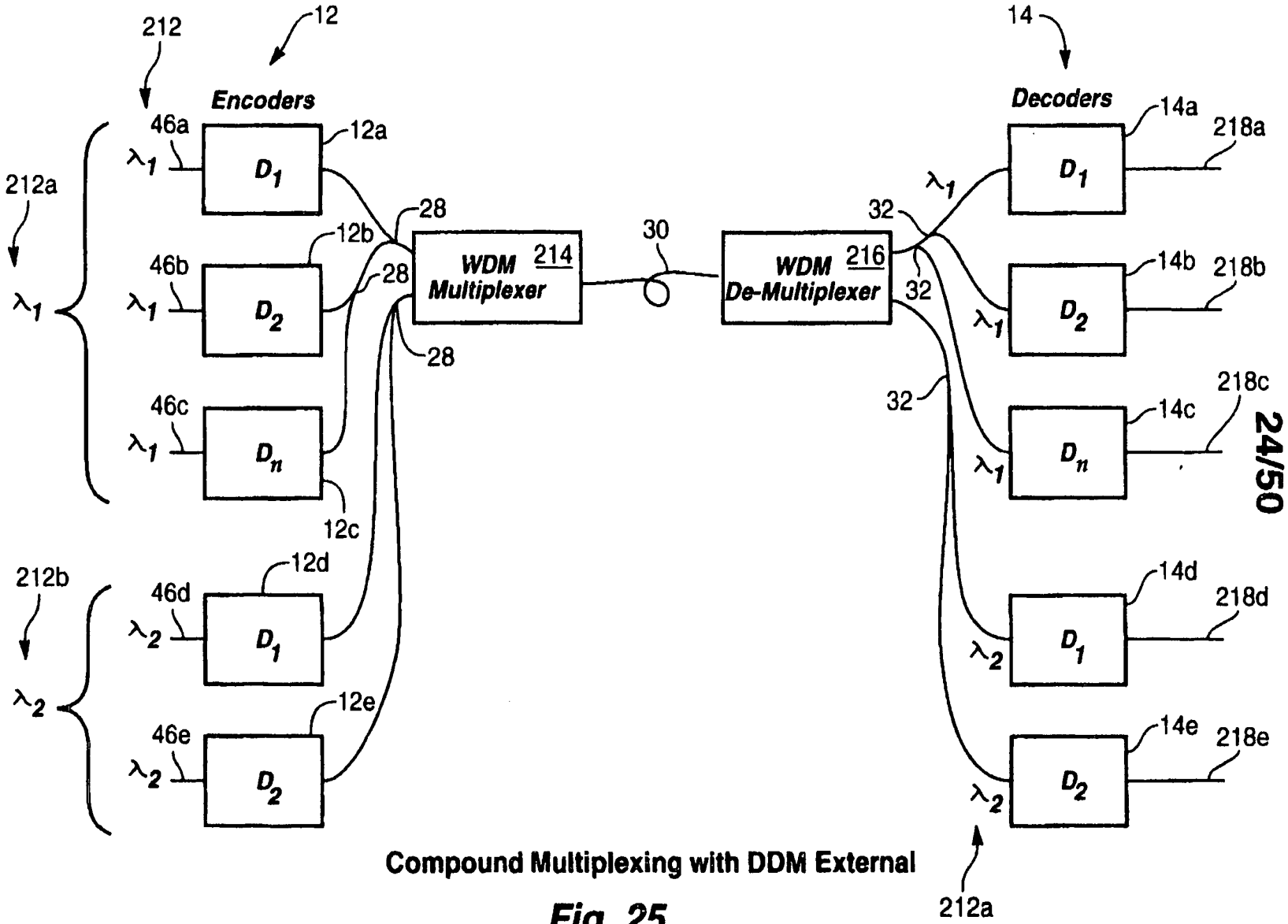

190
14
Decoders
D1 200
D2 202
D3 204
194
Fiber
192
Fiber
12
Encoders
D1 211
D3 208
D2 206
196
Fiber
203
201
205a
205b
D1 210
198
Fiber
209a
209b
209c
209d
Content-Based Channel-Selection Processor 207
199
Control Signal
Drop/Rearrange/Add
Unbuilding/Rebuilding

Fig. 24



Compound Multiplexing with DDM External

Fig. 25

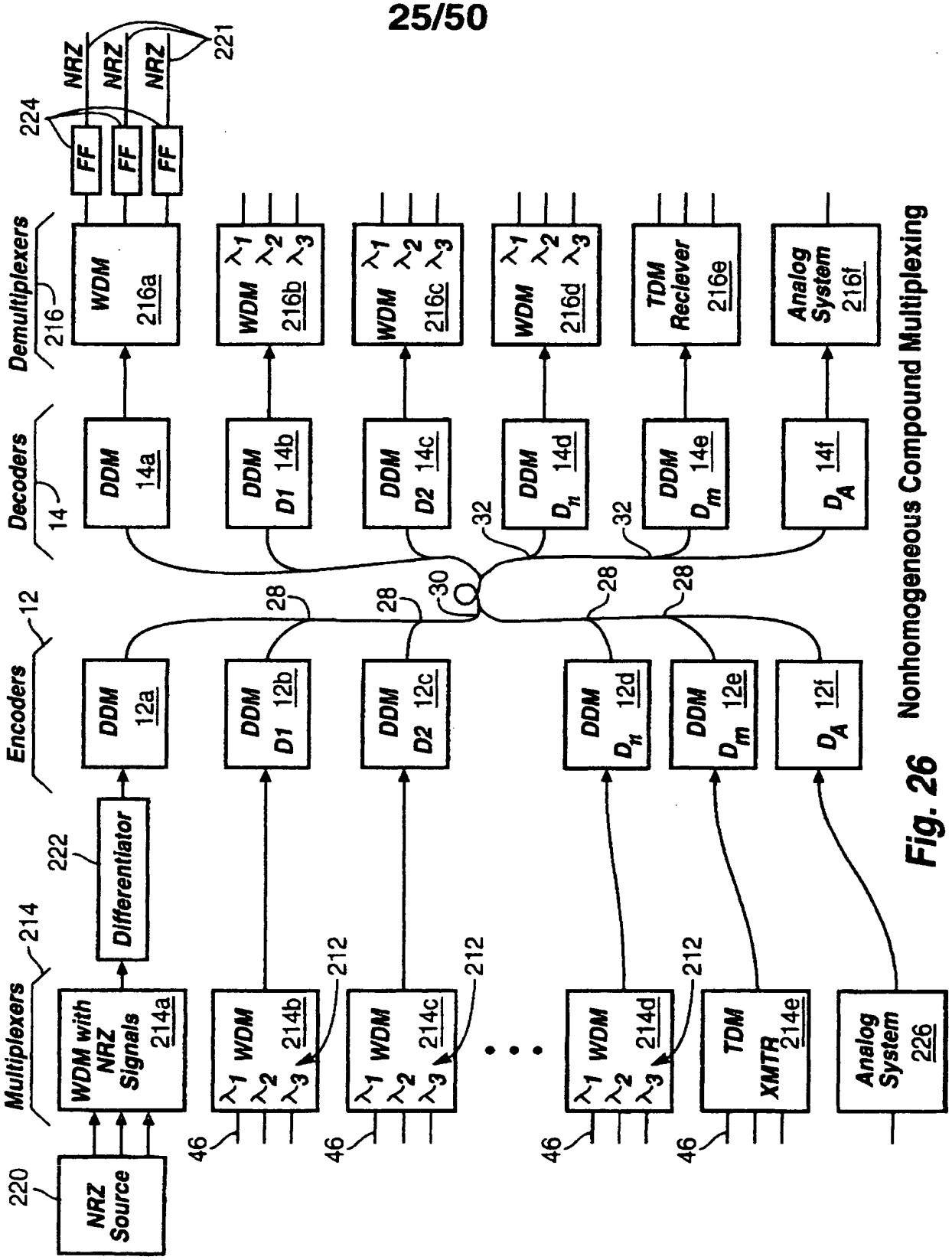
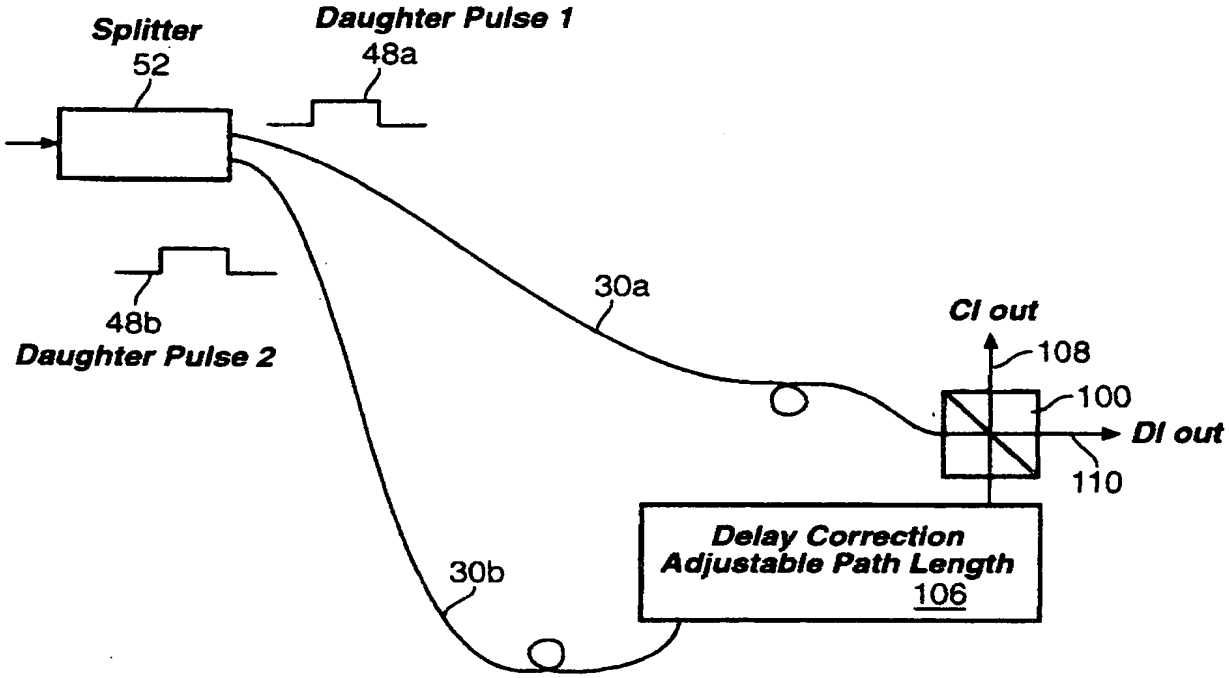


Fig. 26 Nonhomogeneous Compound Multiplexing



Multiple Delay Path

Integrated Delay and Delay Correction

FIG. 27

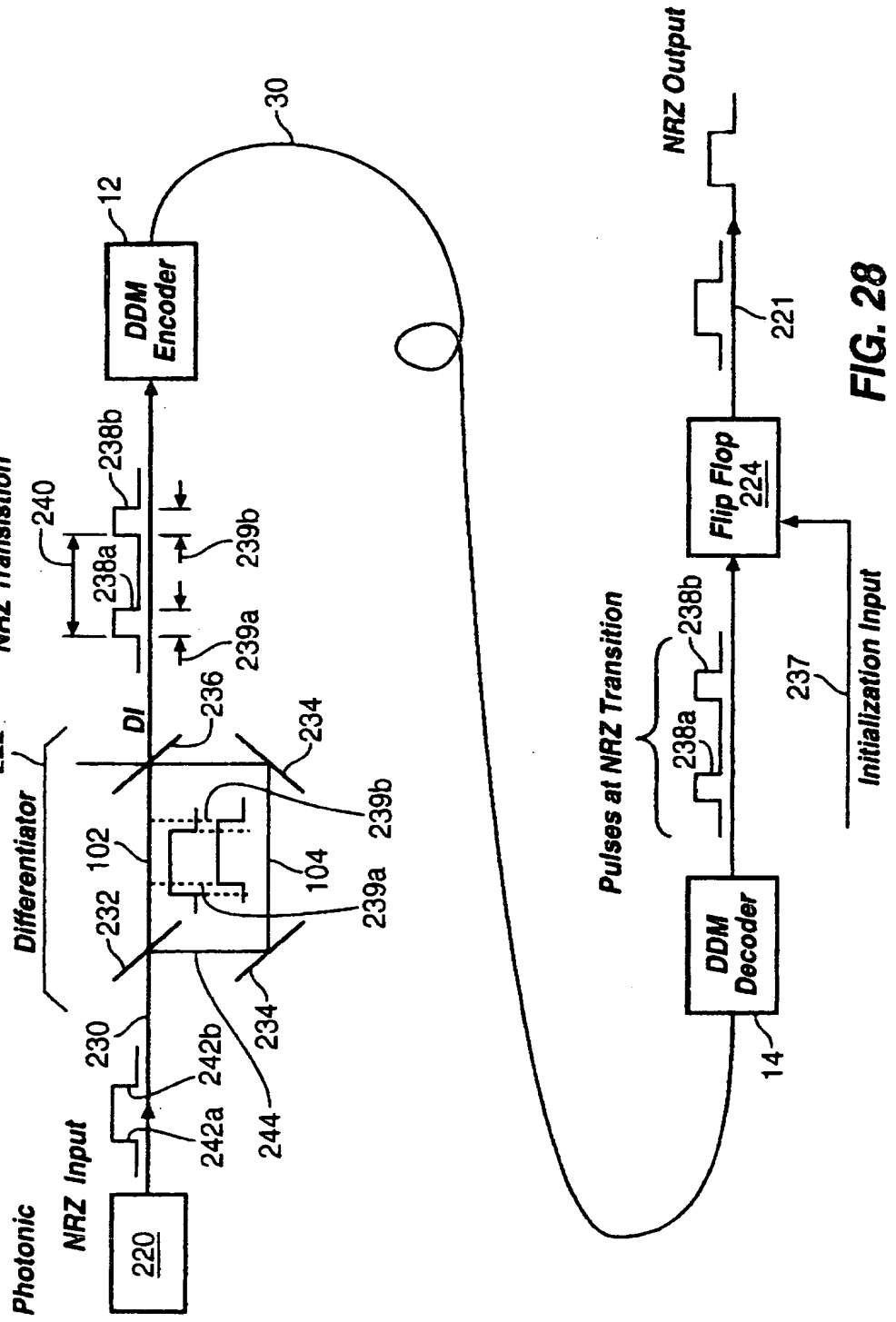

Photonic NRZ Interface
Photonic NRZ Input
220
230
242a
242b
244
Differentiator
222
232
102
104
234
236
DI
239a
239b
Short Pulses at NRZ Translation
240
238a
238b
DDM Encoder
12
30
DDM Decoder
14
Pulses at NRZ Transition
Flip Flop 224
237
Initialization Input
221
NRZ Output

FIG. 28

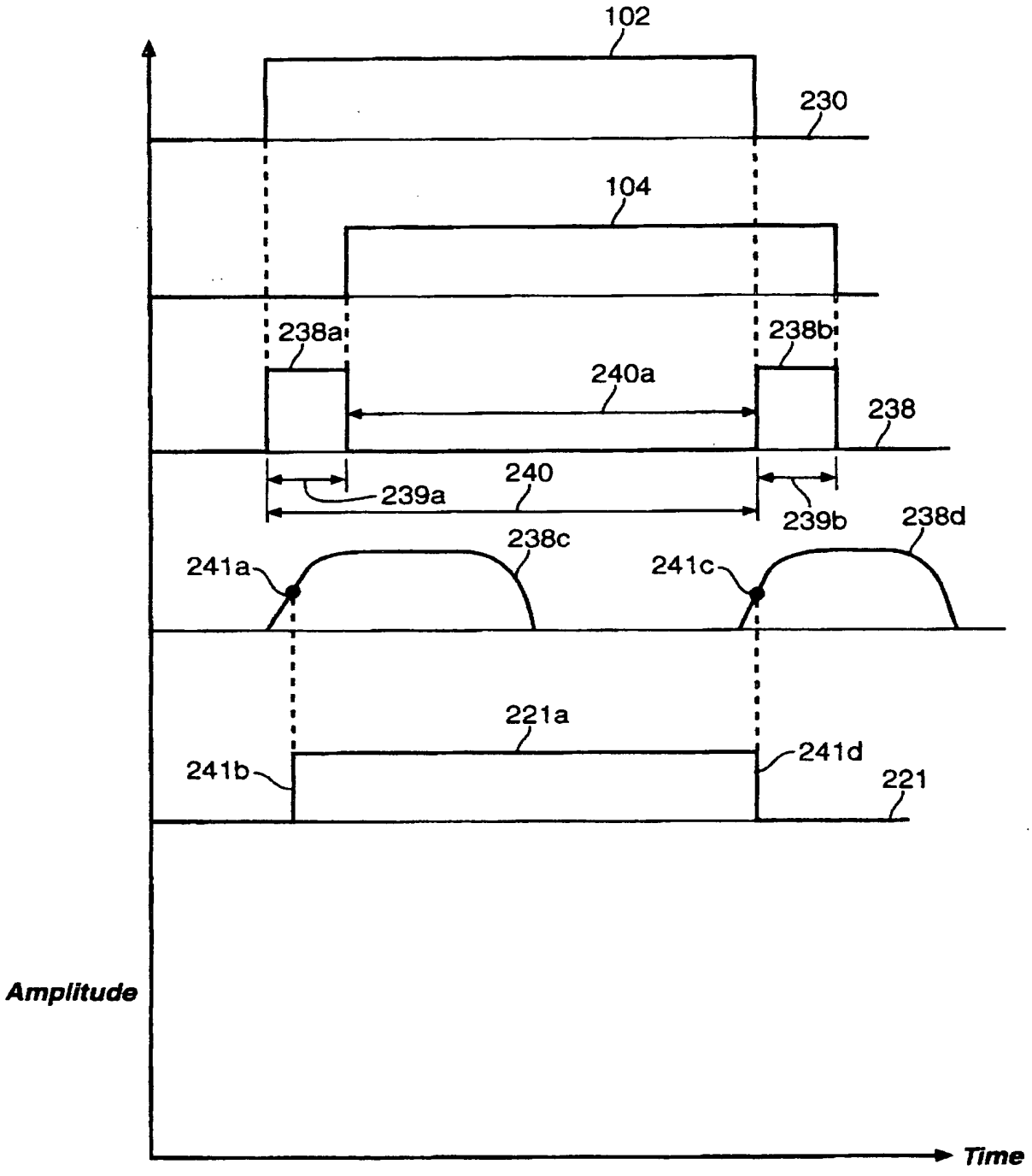
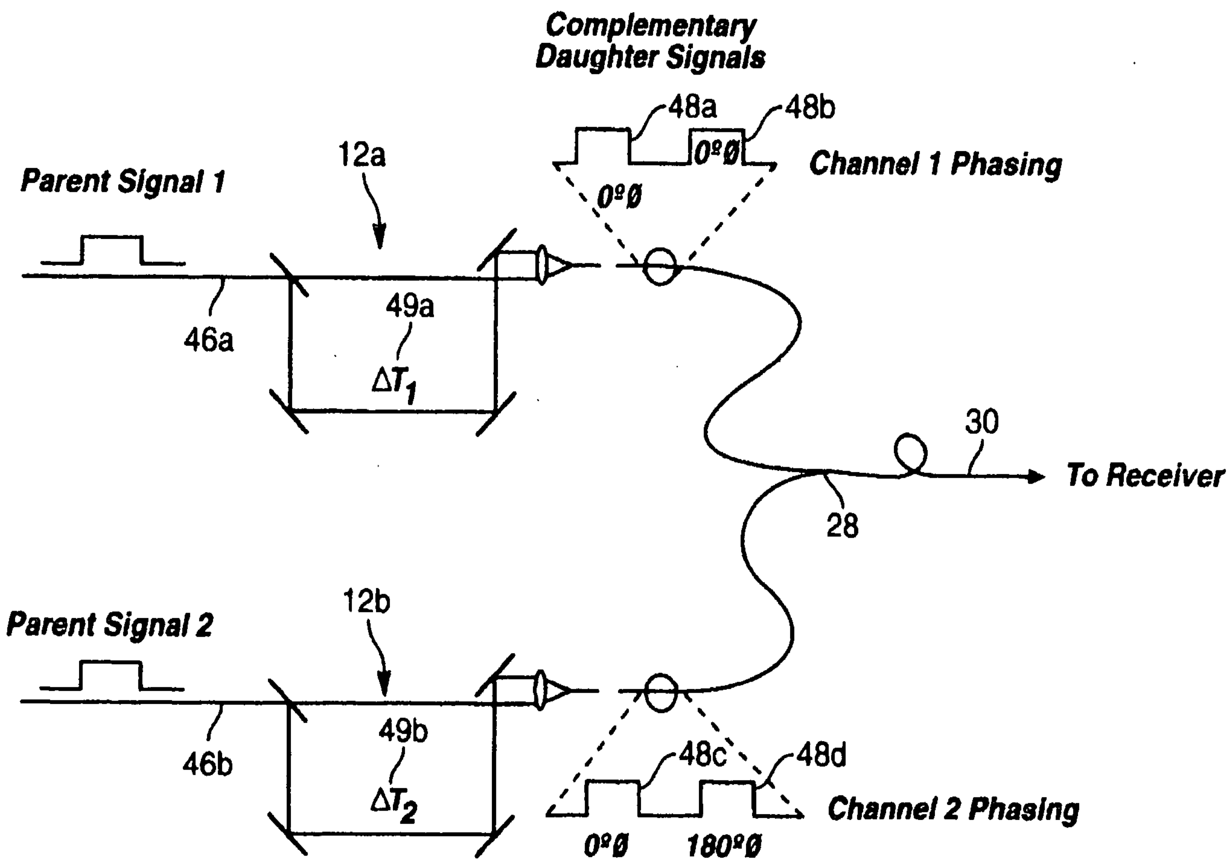

102
230
104
238a
238b
240a
238
240
239a
239b
238d
238c
241a
241c
221a
241b
241d
221
Amplitude
Time

FIG. 29



Phase Sequenced Dual Channel Encoder

FIG. 30

Phase Sequenced Dual Channel Decoder

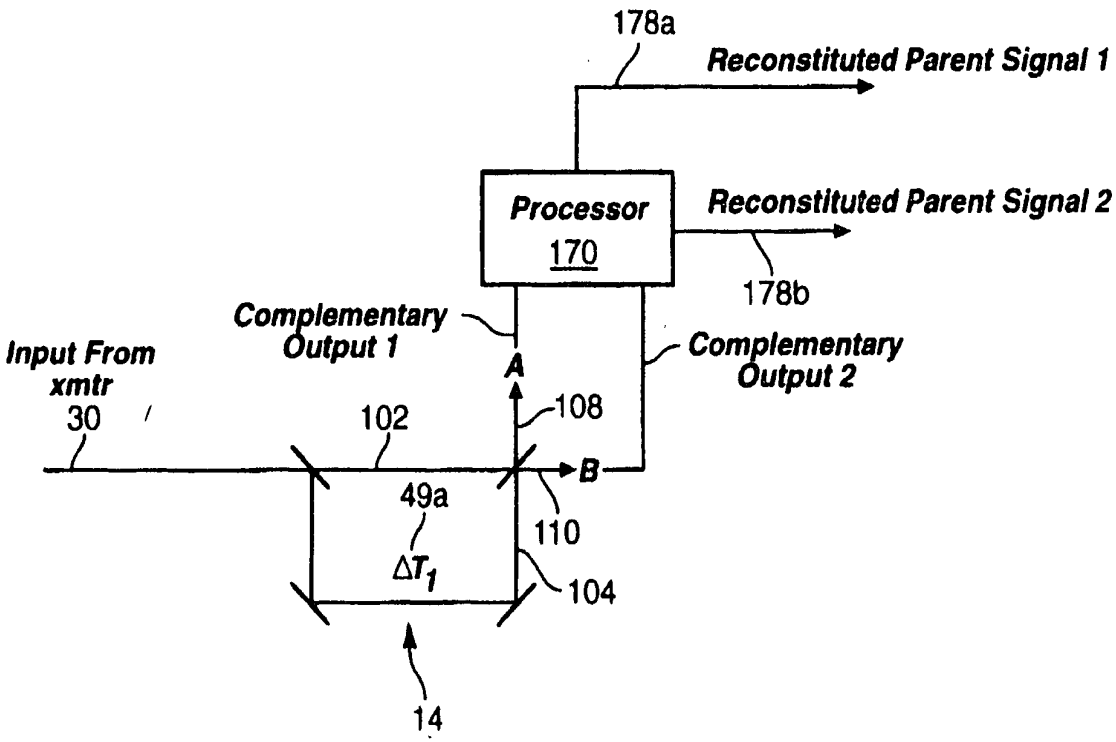


FIG. 31

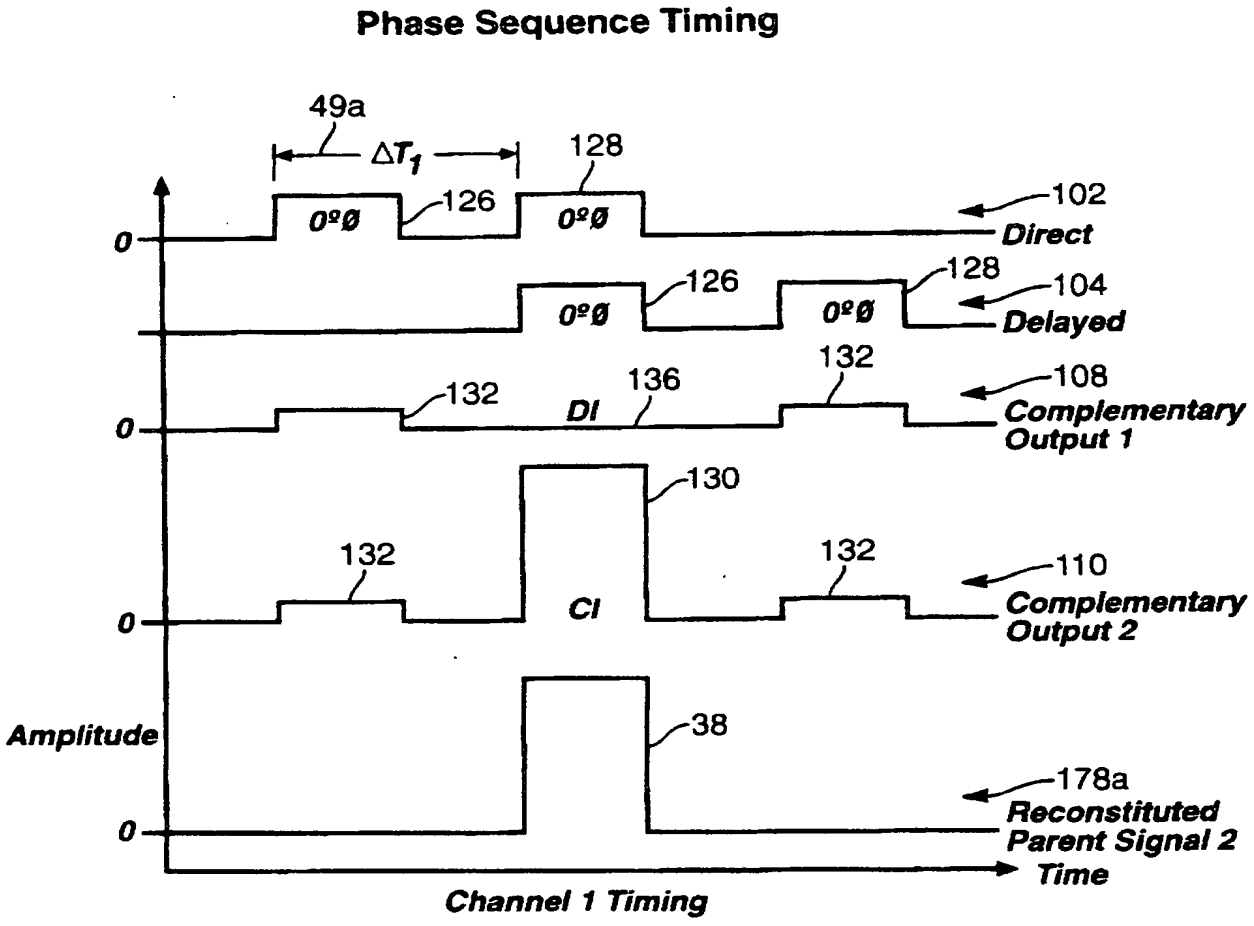

Phase Sequence Timing
49a
ΔT_1
128
126
102
0ºØ
0ºØ
Direct
0
126
128
104
0ºØ
0ºØ
Delayed
132
136
132
108
DI
Complementary Output 1
0
130
132
132
110
CI
Complementary Output 2
0
Amplitude
38
178a
Reconstituted Parent Signal 2
0
Time
Channel 1 Timing

FIG. 32

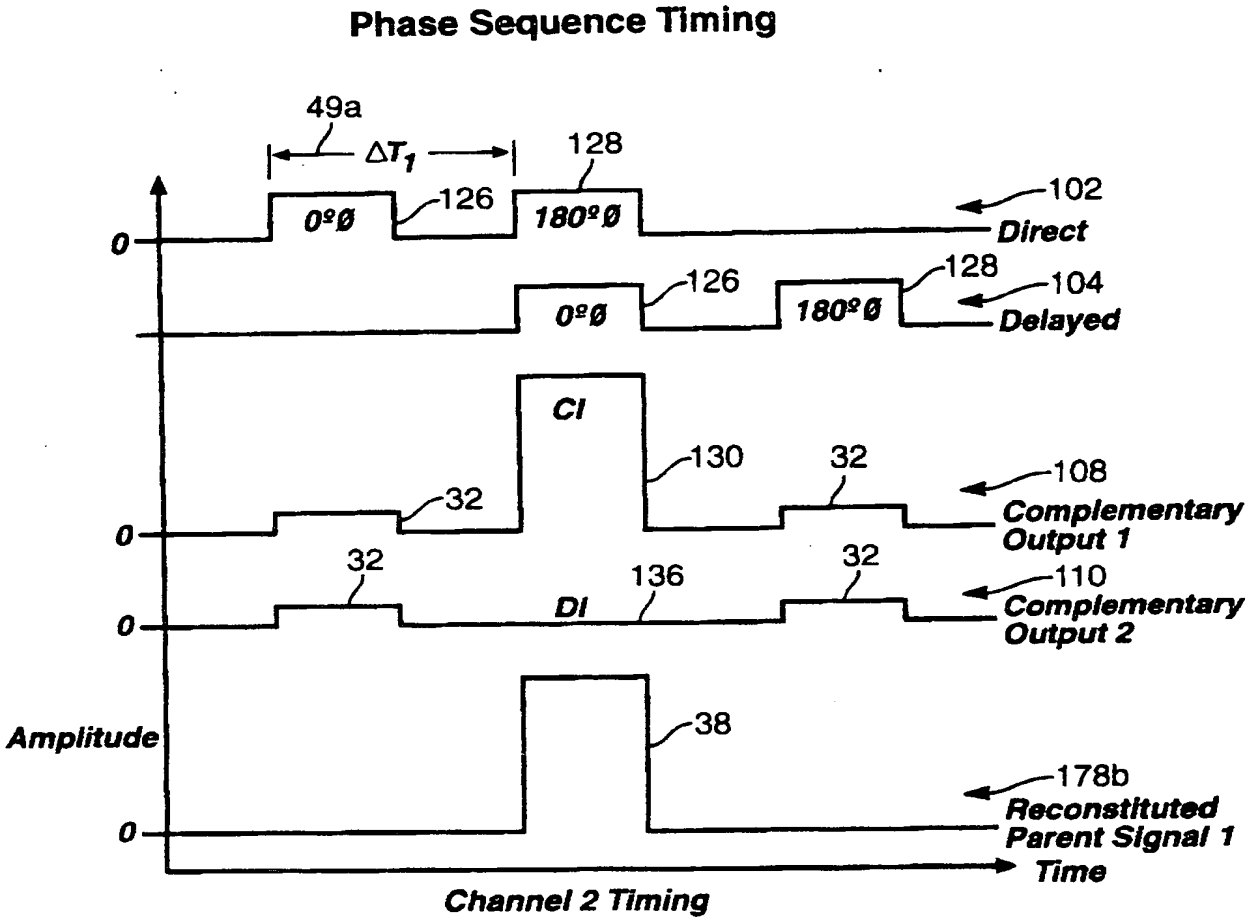

Phase Sequence Timing
49a
ΔT_1
128
126
102
0ºØ
180ºØ
Direct
0
128
126
104
0ºØ
180ºØ
Delayed
CI
130
32
32
108
Complementary Output 1
0
32
136
32
110
DI
Complementary Output 2
0
Amplitude
38
178b
Reconstituted Parent Signal 1
0
Time
Channel 2 Timing

FIG. 33

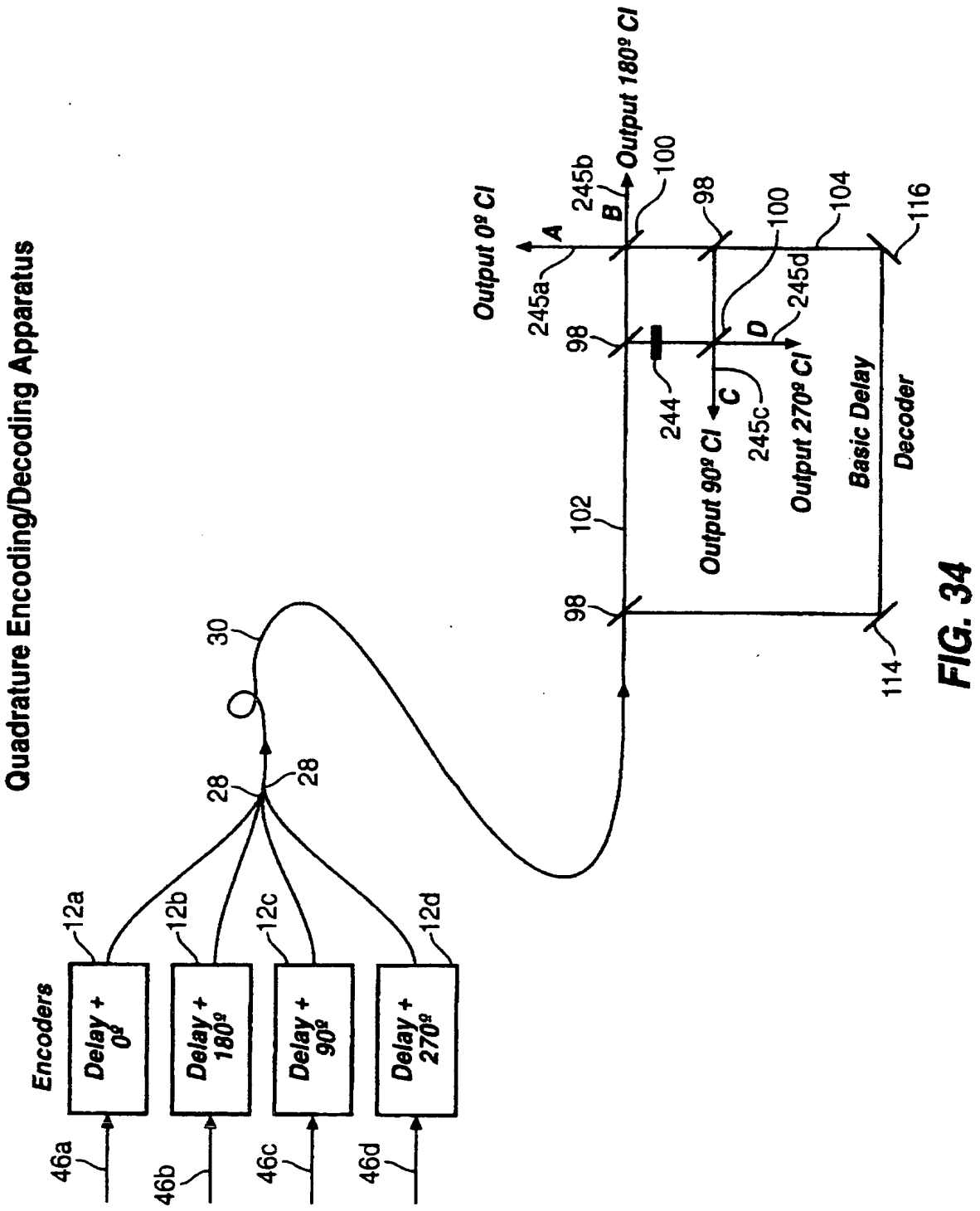

Quadrature Encoding/Decoding Apparatus
Encoders
Delay + 0°
Delay + 180°
Delay + 90°
Delay + 270°
12a
12b
12c
12d
46a
46b
46c
46d
28
28
30
98
102
98
Output 90° CI
Output 270° CI
Basic Delay
Decoder
114
244
245c
245d
104
116
Output 0° CI
Output 180° CI
245a
245b
A
B
C
D
100
98
100

FIG. 34

	Phase of Direct Signal	Phase of Delayed Signal	Quadrature Outputs A	B	C	D
46a → Channel 1	0	0	CI	DI	C =	D
46b → Channel 2	0	180	DI	CI	C =	D
46c → Channel 3	0	90	A =	B	CI	DI
46d → Channel 4	0	270	A =	B	DI	CI
			245a	245b	245c	245d

FIG. 35

Quadrature Wave Forms For One Channel

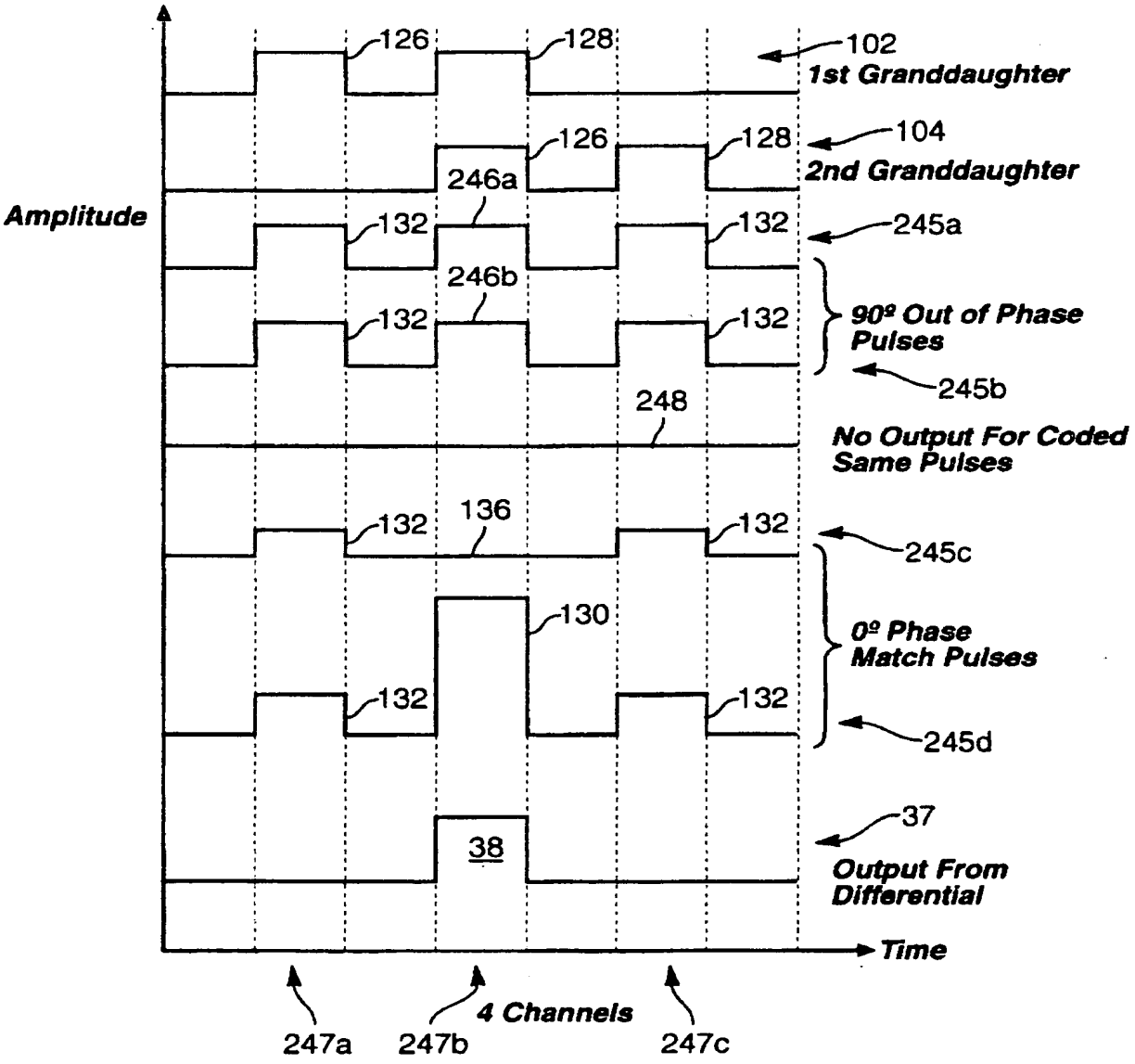


FIG. 36

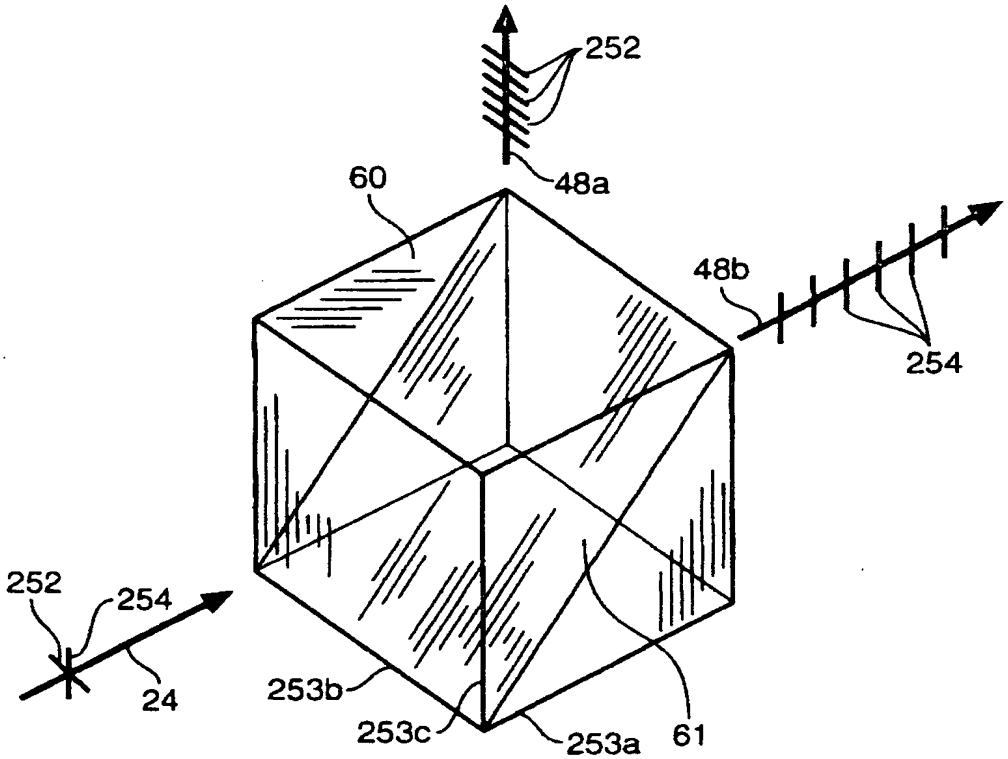


FIG. 37A

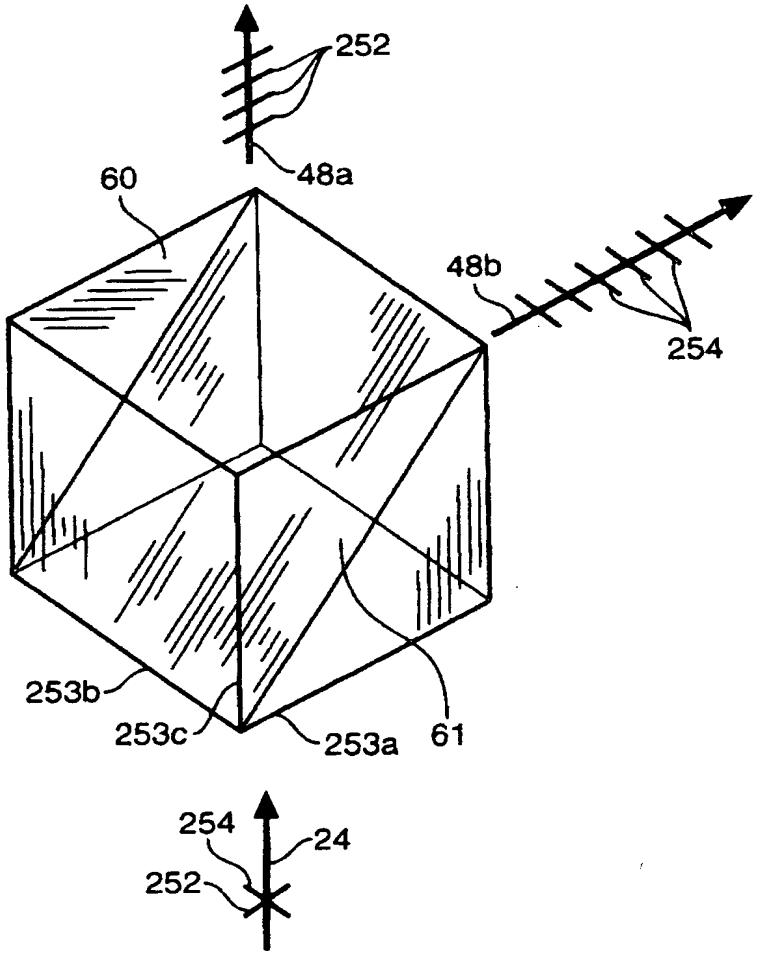
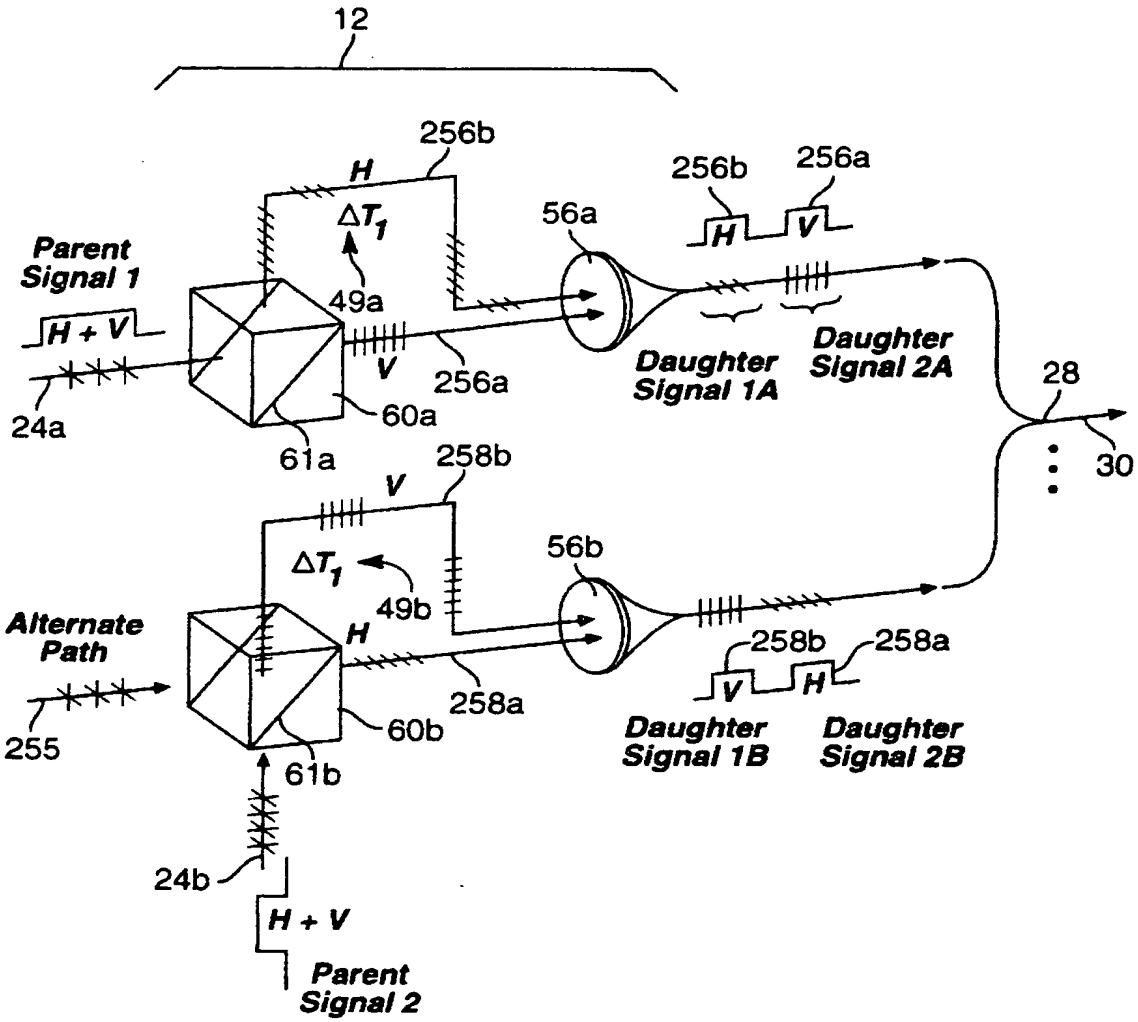
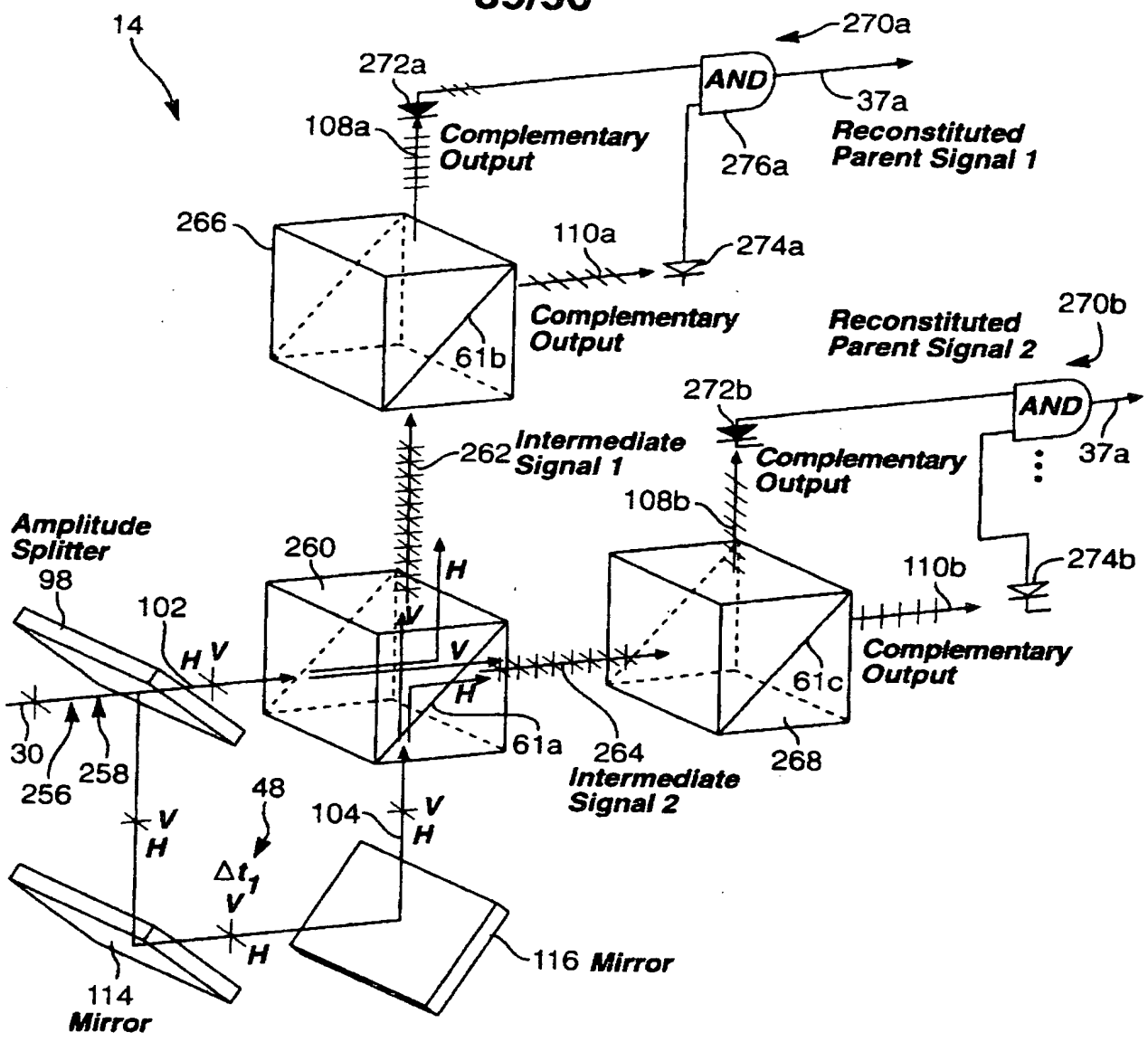


FIG. 37B



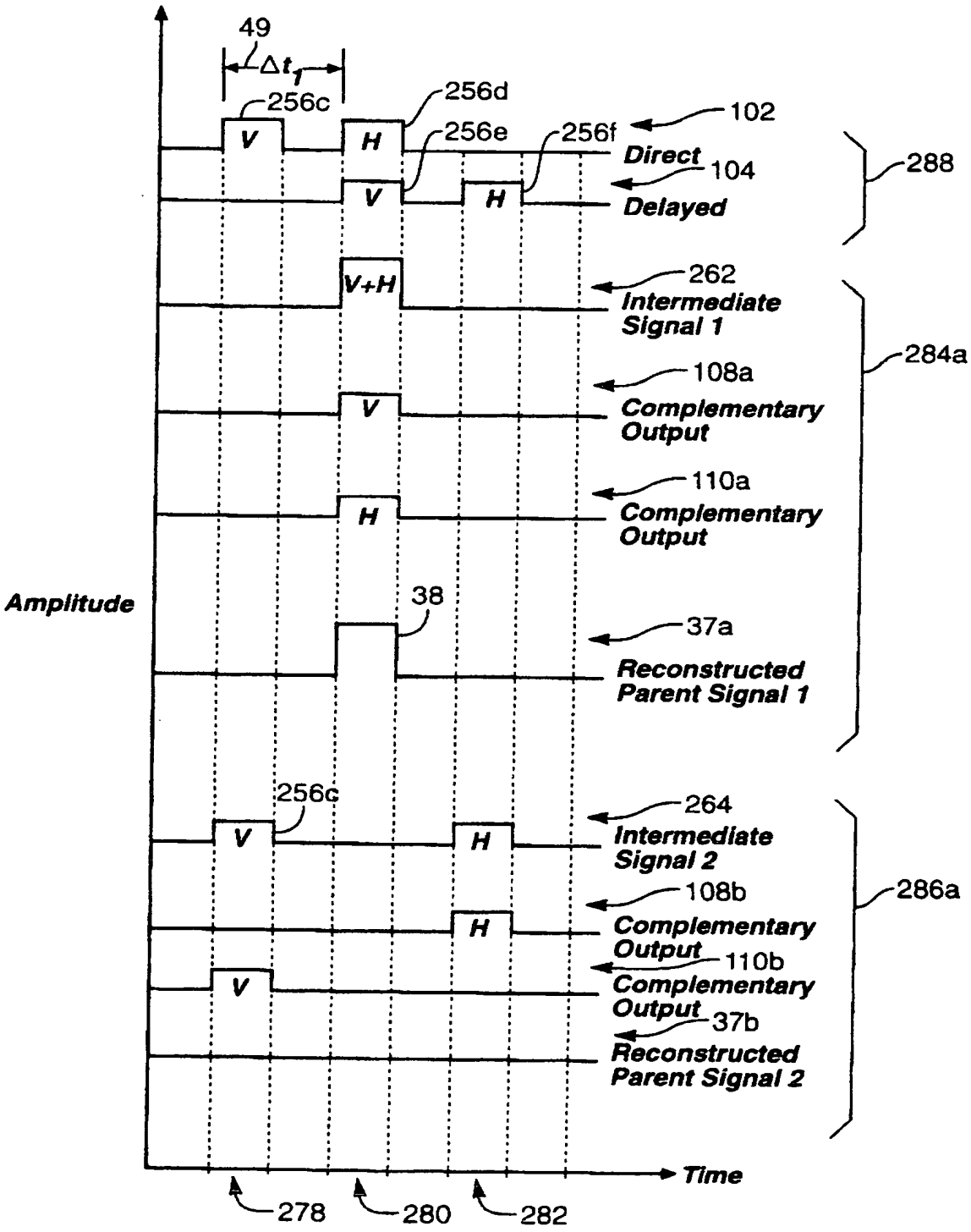
Double Encoder With Polarizations Sequenced to Differentiate 2 Channels Having the Same Time Delay Between Daughter Signals

FIG. 38



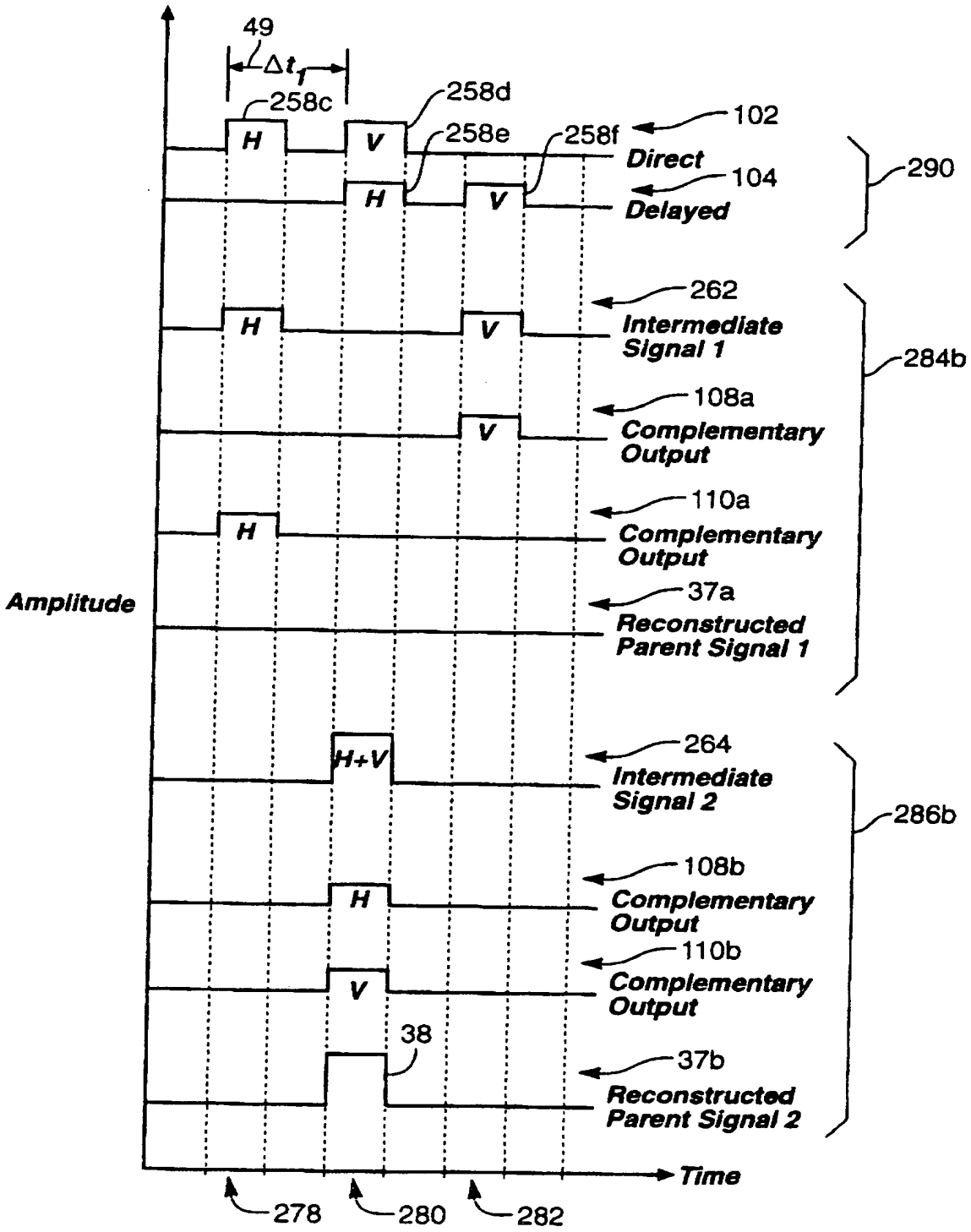
Double Decoder With Polarizations Sequenced to Differentiate 2 Channels Having the Same Time Delay Between Daughter Signals

FIG. 39



Polarization Sequenced Channel 1 Timing

FIG. 40



Polarization Sequenced Channel 1 Timing

FIG. 41

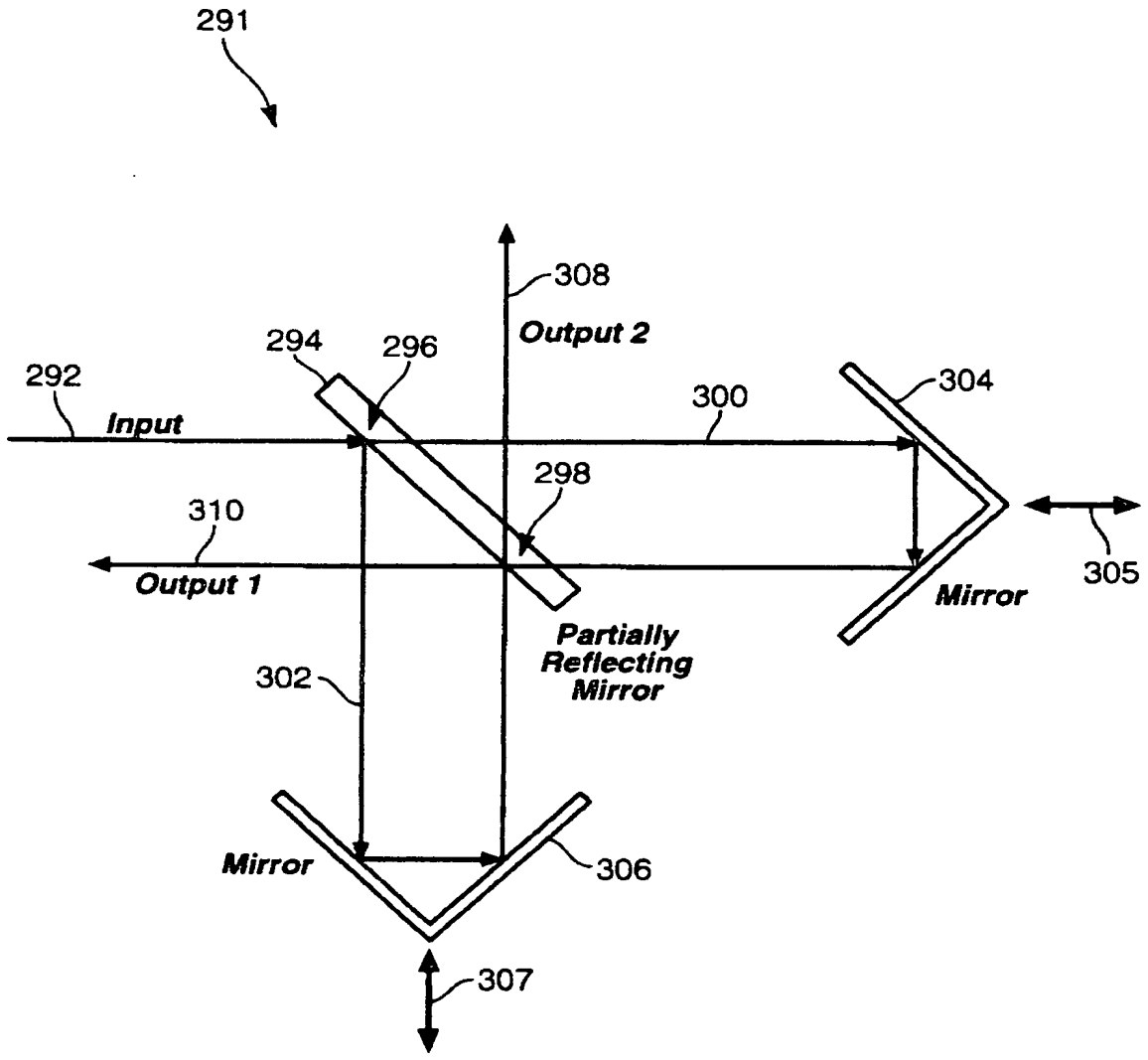

291
308
Output 2
294
296
292
Input
300
304
298
310
Output 1
305
Mirror
Partially
Reflecting
Mirror
302
Mirror
306
307

FIG. 42

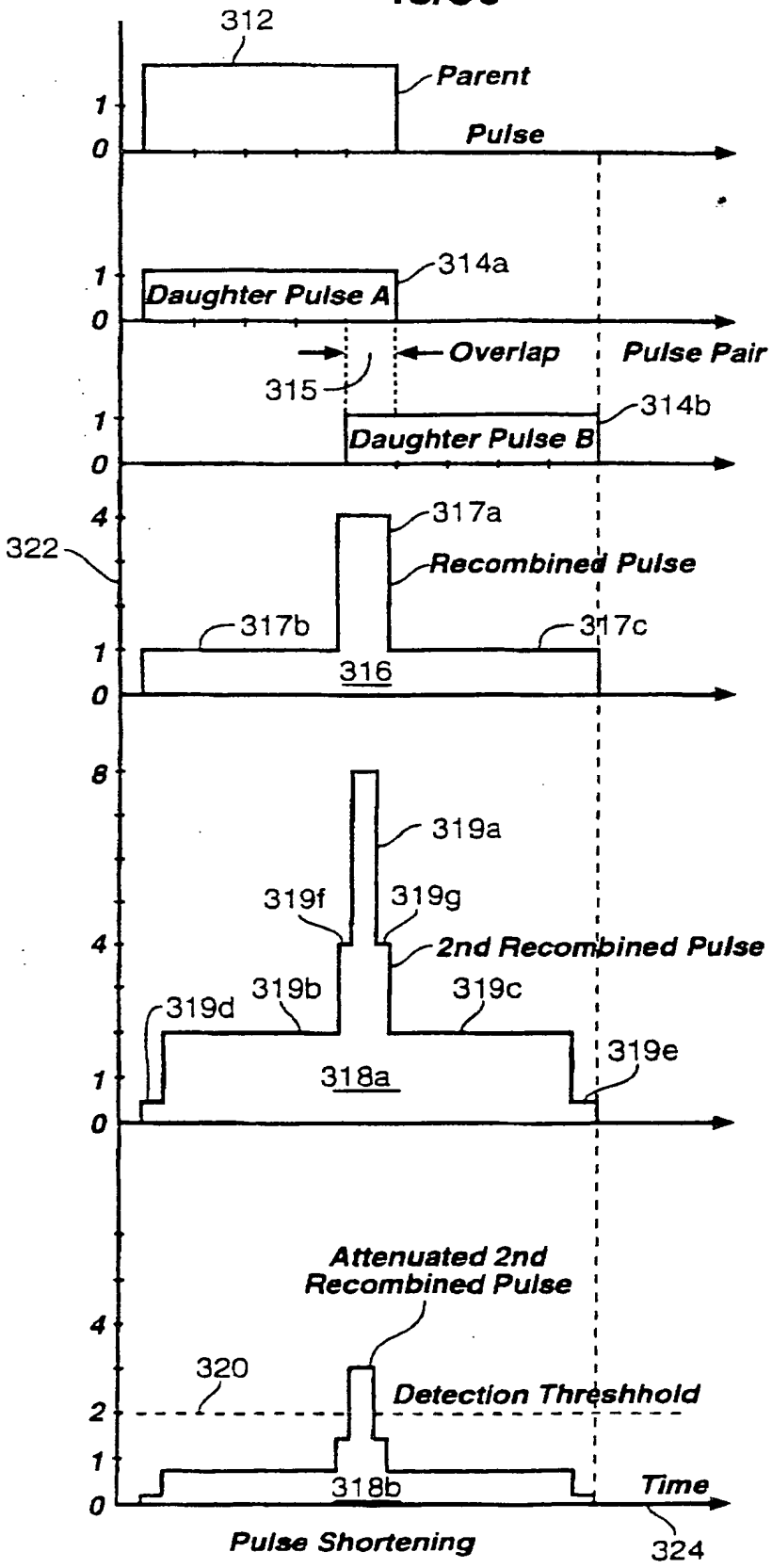

312
Parent
Pulse
1
0
314a
Daughter Pulse A
Overlap
Pulse Pair
315
314b
Daughter Pulse B
4
322
317a
Recombined Pulse
317b
317c
316
8
319a
319f
319g
2nd Recombined Pulse
319b
319c
319d
319e
318a
Attenuated 2nd
Recombined Pulse
320
Detection Threshhold
2
318b
Time
324
Pulse Shortening

FIG. 43

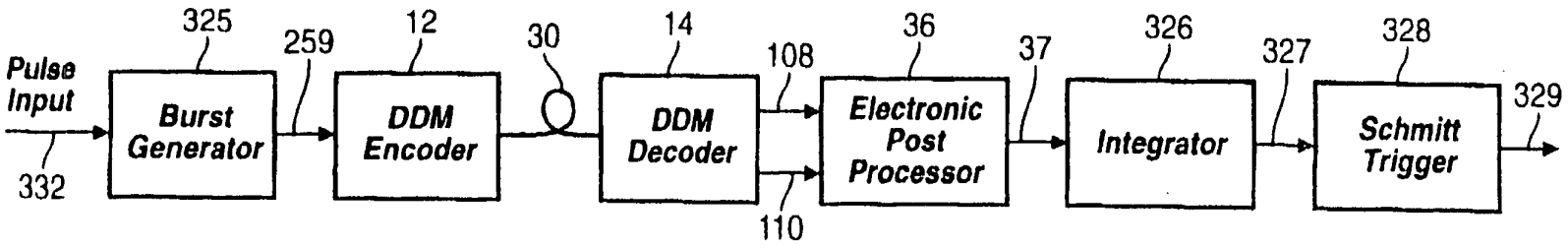


FIG. 44

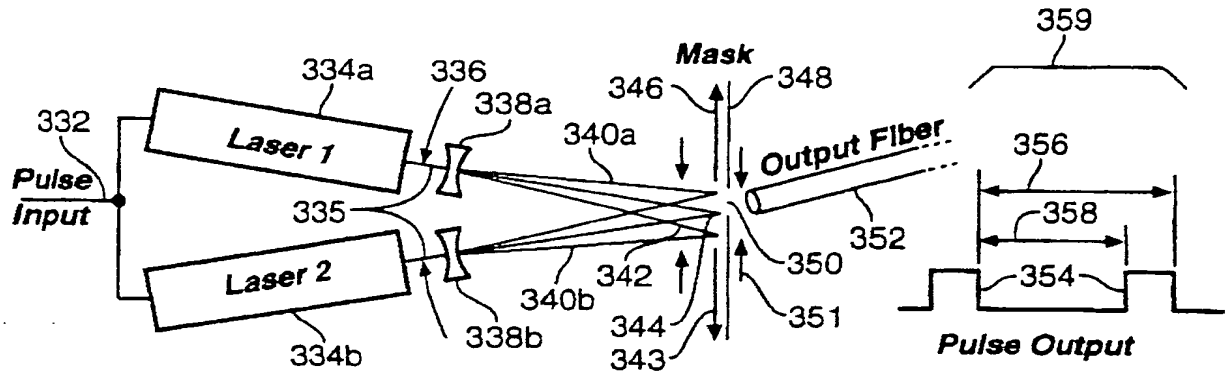

359
Mask
334a
336
346
348
332
338a
340a
Laser 1
Output Fiber
356
Pulse
Input
335
358
352
Laser 2
350
342
354
340b
344
351
338b
334b
343
Pulse Output

FIG. 45

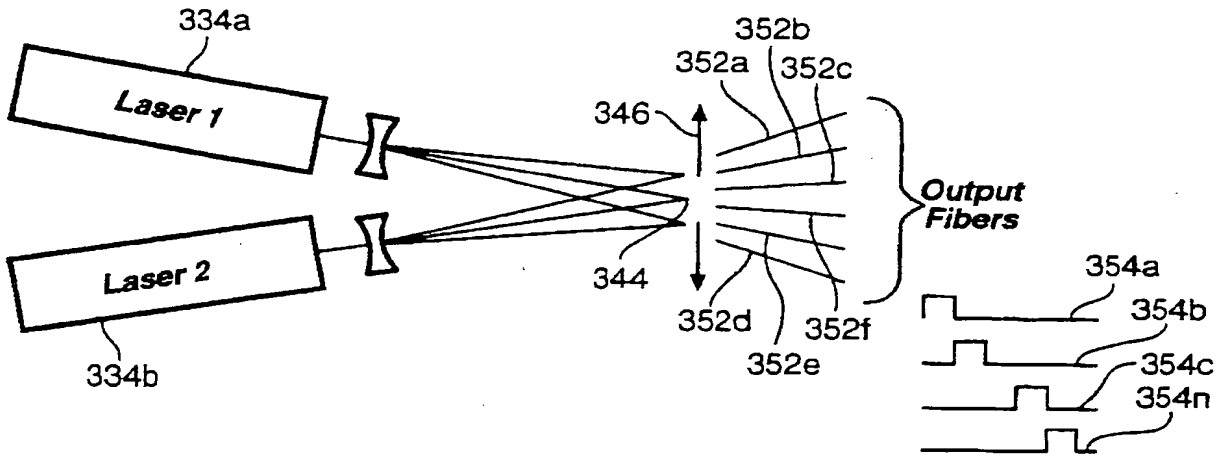

334a
Laser 1
Laser 2
334b
346
344
352a
352b
352c
352d
352e
352f
Output Fibers
354a
354b
354c
354n

FIG. 46

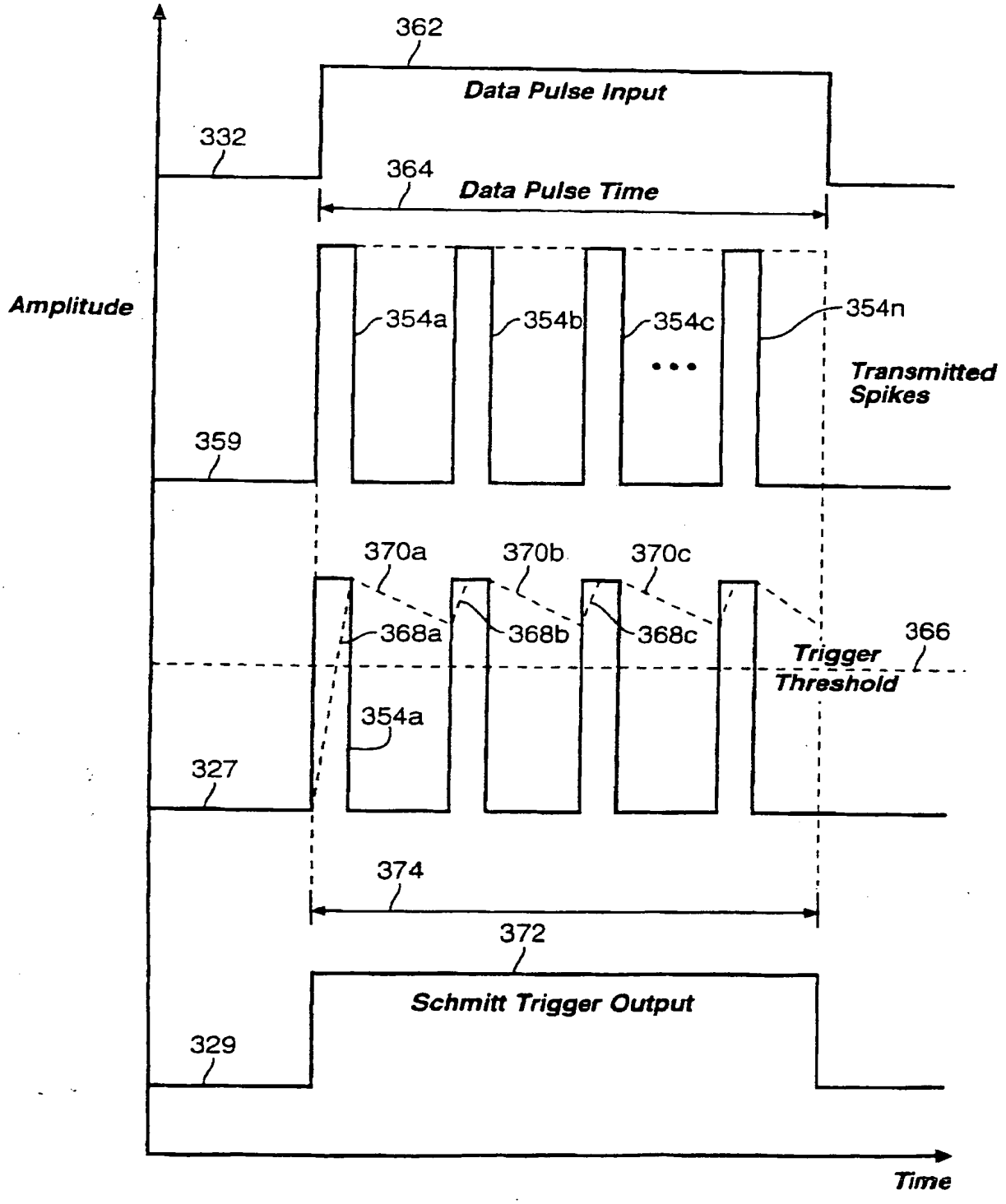

362
Data Pulse Input
332
364
Data Pulse Time
Amplitude
354a
354b
354c
354n
Transmitted Spikes
359
370a
370b
370c
368a
368b
368c
366
Trigger Threshold
354a
327
374
372
Schmitt Trigger Output
329
Time

FIG. 47

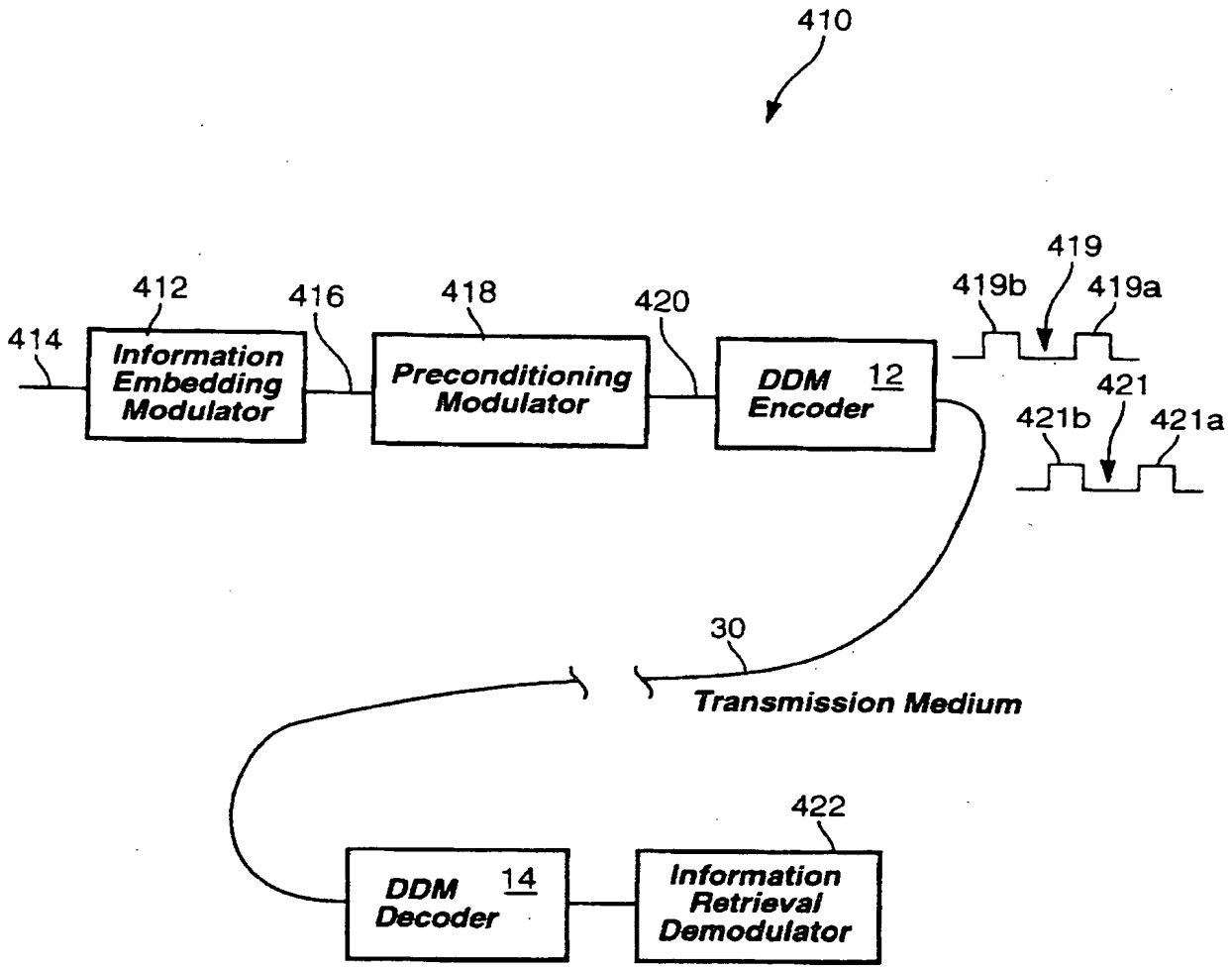

410
412
414
Information Embedding Modulator
416
418
Preconditioning Modulator
420
DDM 12 Encoder
419
419b
419a
421
421b
421a
30
Transmission Medium
422
DDM 14 Decoder
Information Retrieval Demodulator

FIG. 48

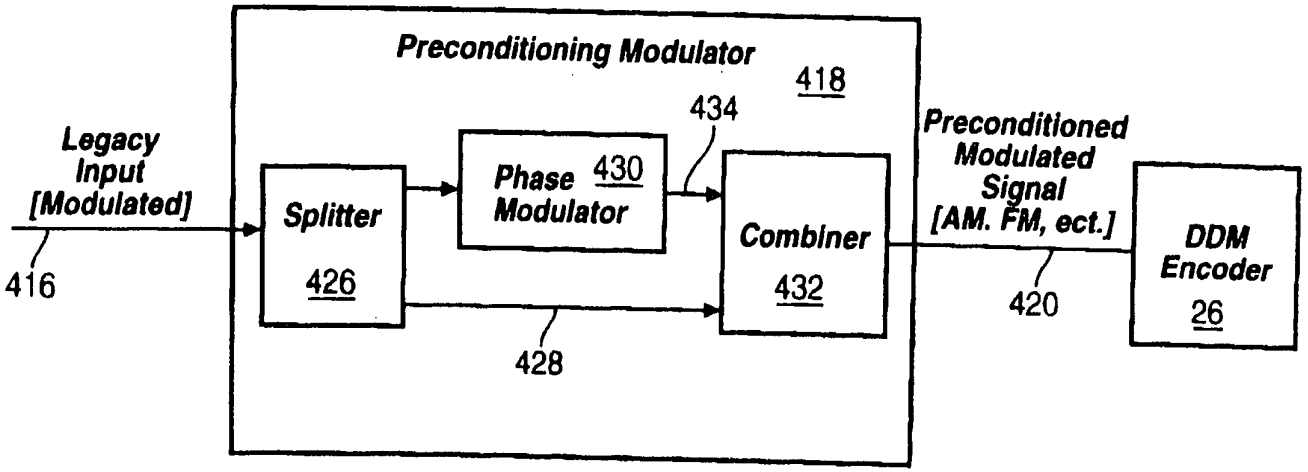


FIG. 49

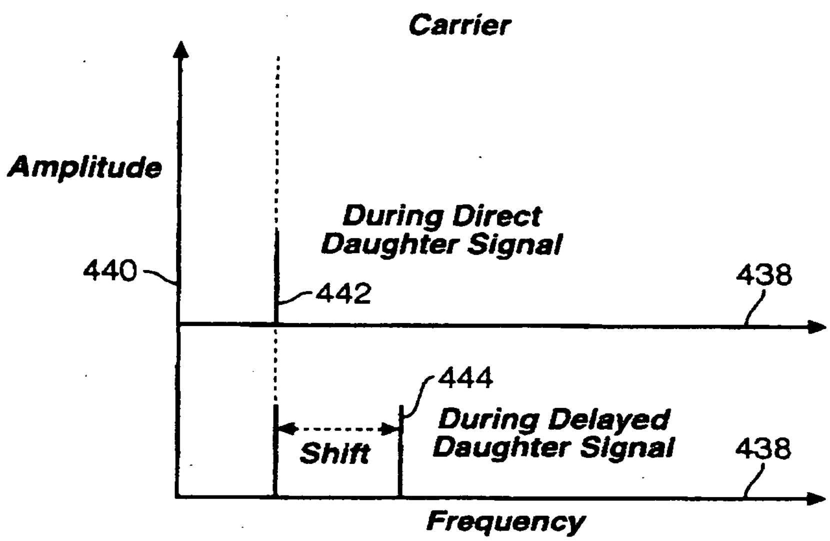

Carrier
Amplitude
During Direct
Daughter Signal
440
442
438
444
During Delayed
Daughter Signal
Shift
438
Frequency

FIG. 50